CAIS STANDARD MANUAL

SYSTEM NO. 19
PAVEMENTS/
IMPROVED SURFACES

CAS PROJECT
CAIS MANUAL

Issued April 28, 1995

8 Mar 96

MEMORANDUM FOR DTIC-OCP
ATTN: Ms. Lue Lynch
8725 John J. Kingman Road, Suite 0944
Fort Belvoir, VA 22060-6218

FROM: AL/EQ (STINFO)
139 Barnes Drive. Suite 2
Tyndall AFB FL 32403-5323

SUBJECT: Transmision of Technical Documents

1. As per telephone conversation with Andrew Poulis, EQ/TIC, the attached CAIS CTDS manuals are forwarded for accession, cataloging, and microconversions. Please forward the accession numbers to:

Andrew Poulis
AL/EQ/TIC
139 Barnes Drive. Suite 2
Tyndall AFB, FL 32403-5323

2. The Distribution statement should read as follows: Approved for Public Release: Distribution Unlimited.

3. If you have questions about these documents, please contact Andrew Poulis at DSN 523-6285.

LARRY L. TESTERMAN
Scientific and Technical
Information Program Manager

Atchs: Manuals

19 PAVEMENTS/IMPROVED SURFACES

TABLE OF CONTENTS

19 PAVEMENTS/IMPROVED SURFACES

PAGE

SUBSYSTEM 19.02 PARKING LOTS

SUBSYSTEM 19.03 SIDEWALKS/WALKWAYS

SUBSYSTEM 19.04 OPEN STORAGE AND HARDSTANDS

19 PAVEMENTS/IMPROVED SURFACES

PAGE

APPENDICES

19 PAVEMENTS/IMPROVED SURFACES

ABSTRACT

GENERAL ORGANIZATION

At this installation the list of facilities to be surveyed, including infrastructure, will be addressed on the basis of 32 unique systems that form the CAIS Engineering Deficiency Standards and Inspection Methods document. Each system deals with a specific technical aspect of the facility to be surveyed. Within each system a further breakdown is made to subsystems, each having a related list of components. Detailed observations of the listed defects are provided so as to allow the entry of observed quantification data. A DOD CAIS manual is provided for each of the 32 systems with an internal organization as outlined below:

INSPECTOR'S GUIDE

I. General
   - A. Level I Inspection Method Description
   - B. Level II Inspection Method Description
   - C. Level III Inspection Method Description

II. General Inspection
   - A. Process. This section describes the process of the inspection activity.
   - B. Location. This section describes the procedure for locating the inspection units in the facility or infrastructure on this installation.

III. Inspector Qualifications
   This section notes the minimum qualifications for the person or persons performing the survey.

IV. Inspection Unit
   This section describes how the IU (Inspection Unit) is determined for the particular component being surveyed.

V. Unit Costs
   This section notes the nature of repair costs for this system.

VI. Standard Safety Requirements
   This section lists safety procedures and equipment required to implement a safe environment for the conduct of this survey.

VII. Standard Tools
   This section lists a set of standard tools required for the general conduct of this survey.

VIII. Special Tools and Equipment Requirements
   This section refers to special tools or equipment requirements endemic to the nature of the system being surveyed.

19 PAVEMENTS/IMPROVED SURFACES

IX. Level II Inspection Method Keys
This section explains and locates Level II Key sheets.

X. Level III Inspection Method Keys
This section explains and locates Level III Key sheets.

XI. Replacement Cost
This section describes the nature and location of replacement cost data.

XII. Appendices
Appendix A. Provides a summary and definition of all abbreviations used both in the Standards and in the data base.

Appendix B. Provides a glossary of terms with their definitions as used in the Standard.

Appendix C. This section contains a listing of the average life cycle durations for each assembly* in the Standard.

* Assembly is a term describing the level at which replacement rather than repair occurs. This can be at the subsystem or component designation, depending on the system being surveyed.

SYSTEM TREE

The System Tree is a graphical representation of the Work Breakdown Structure, showing system, subsystem and component relationships for the Pavements/Improved Surfaces System.

INSPECTION METHODS

Description
Describes the nature of what is to be condition surveyed.

Special Tool and Equipment Requirements
Lists any special tools required for this specific subsystem.

Special Safety Requirements
This section outlines any special safety measures or equipment required for this specific subsystem so as to maintain a safe environment and process in the conduct of the condition survey.

Component List
All components to be surveyed under this subsystem are listed here.

Related Subsystems
All other subsystems that have a survey relationship to this subsystem are listed here to help coordinate a complete and thorough condition assessment survey.

19 PAVEMENTS/IMPROVED SURFACES

Standard Inspection Procedure

This statement indicates the various levels of survey effort required for this subsystem.

Components

The previously listed components of this subsystem are described with a survey procedure recommended on a component by component basis. For each component there is a listing of defects with each defect broken down into observations describing the nature and severity of the defective condition observed. The surveyor enters a quantification value for each defect/observation encountered in the field CAIS device (DCD) to record the result of his survey.

References

This page lists the reference sources from which the foregoing subsystem data was developed.

Guide Sheet Control Number

This section lists the key numbers that tie the written Level II and Level III guide sheets to specific components in this subsystem.

Level II and Level III Inspection Method Guide Sheets

This section contains the detailed descriptions of the Level II and III survey and inspection procedures for this subsystem.

19 PAVEMENTS/IMPROVED SURFACES

INSPECTOR'S GUIDE

I. GENERAL

A. Level I Inspection Method

The Level I inspection of Pavement/Improved Surfaces consists of a thorough inspection of pavement surfaces as described in the work breakdown structure. The pavement standard inspection is a walk-by inspection taking measurements. A drive-by ride quality inspection using a standard vehicle may be performed in addition to a walk-by inspection to determine the level of severity of defects as needed. The standard inspection is designed to be performed by one person. Although a pavement system may consist of two to four components, only the surface layer can be inspected as part of the Level I inspection.

B. Level II Inspection Method

The Level II inspection is not required because this inspection is essentially a much more detailed inspection, and reinspection of the Level I inspection.

C. Level III Inspection Method

Analyses of the Level I data may indicate that the pavement requires further investigation and testing to formulate a rehabilitation strategy. In such cases, the identified pavement assets will be using the Level III inspection techniques. For pavement assets, the Level III inspection may involve a more extensive testing consisting of Non-Destructive Testing (NDT) to measure pavement deflection, and partially destructive testing to determine physical and engineering properties of pavement components. The Level III inspection and testing may be required for one or all pavement components.

II. GENERAL INSPECTION

A. Process

The inspection is normally conducted at the component level. Figure 19-A shows various components of the pavement structure. Some or all components shown are present in the Roadways, Parkings, Walkways, and Open Storage and Hardstands. At the component level, the inspector will be provided a list of defects, each of which is described further as observations. Each observation defines a level of severity for each defect. The inspector is required to record the quantity of each observed defect using the associated unit of measure.

Figure 19-A, shown at the end of the Inspector's Guide, provides the Deficiency Standard/Inspection Method (DS/IM) organization through components for Pavement/Improved Surfaces.

19 PAVEMENTS/IMPROVED SURFACES

II. GENERAL INSPECTION (Continued)

B. Location

Level I and II inspections will be located by the inspector through a discrete entry into the Data Collection Device. The "IU" or component location will be derived from Facility-supplied segment numbering lists, maps or other I.D. numbering systems. For building associated "IU's" and components the Facility shall furnish plans annotated with room number schedules. In the case of non-room associated components, plans will be orientated with the top of each sheet being the north direction, so as to allow directional location and description. In the case where no maps, or plans are available the inspector shall enter a brief (65 character) description of location.

III. INSPECTOR QUALIFICATIONS

The personnel performing Level I inspections of Pavements and Improved Surfaces should have a minimum of 5 years experience in inspecting roadways, parking areas, walkways, storage areas and hardstands. In addition, the inspector(s) must be experienced in readily identifying various defects outlined in this manual.

IV. INSPECTION UNIT (IU)

Because of the type, length and area of the pavements involved on a installation, the pavement should be divided into branches. Each branch should be divided into sections. Each section should be divided into Sample Units. Representative samples for the section should be selected for inspection.

As a minimum, inspect the following sample units, which should be spaced at approximately equal intervals. The location of the first sample unit can be selected randomly:

Sample Units	Inspect
1 to 5	1 unit
6 to 10	2 units
11 to 15	3 units
16 to 40	4 units
over 40	10% units

Additional sample units may be selected and inspected if the inspector determines that nonrepresentative distresses are present in certain sample units which were not inspected.

19 PAVEMENTS/IMPROVED SURFACES

IV. INSPECTION UNIT (IU) (Continued)

A. Inspection Actions

Asphalt Surfaced Pavement

- Sample units should be permanently marked so that they can be accessed at later dates.
- Measure the length of the sample unit by hand odometer. Inspect the selected sample unit and identify types of physical distresses existing in the pavement.
- Measure and record each distress present at each sample unit.
- Add up the total quantity of each distress type at each severity level.

Concrete Surfaced Pavement

- Divide each inspection unit (sample unit) into a number of slabs at joints. If the joint spacing is greater than 25 feet, limit the sample unit to a maximum slab length of 25 feet. Sample units should be permanently marked so that they can be accessed at later dates.
- Measure the length of the sample unit by hand odometer. Inspect each slab and identify types of physical distresses existing in each slab.
- Measure and record each distress present at each sample unit.
- Add up the total quantity of each distress type at each severity level within each slab at each sample unit.

V. UNIT COSTS

The unit costs that are applied to the quantities recorded for each observation are contained within the Site CAIS as repair cost.

VI. STANDARD SAFETY REQUIREMENTS

Prior to inspection of Pavement/Improved Surfaces, the authority having jurisdiction shall be notified to secure proper access, safety briefings and personal safety items. Inspector shall be alert for vehicle movement near and around him.

VII. STANDARD TOOLS

Employee Identification Card - to be worn or carried during all inspections
Data Collection Device (DCD)
Battery pack for DCD
Tape measure: 50 feet
Scale
Straight edge
Hand odometer wheel
Can spray paint

19 PAVEMENTS/IMPROVED SURFACES

VIII. SPECIAL TOOLS AND EQUIPMENT REQUIREMENTS

Level III Guide Sheets will address additional tools and equipment requirements that are specific to the Level III techniques and other testing methods.

IX. LEVEL II INSPECTION METHOD KEYS

Level II keys are not used for Roadways and Parking Lots because Level II is not applicable for this subsystem.

X. LEVEL III INSPECTION METHOD KEYS

Certain observations will reference a Level III Inspection Method. The Facility Manager will be able to identify deficiencies where a Level III is flagged.

For Pavements/Improved Surfaces, Level III inspection and testing shall include non-destructive testing on pavement surfaces, and partially destructive testing of some or all pavement components. Testing equipment is identified in the guide sheets.

All Level III Guide Sheets are located at the end of each Subsystem section. A Guide Sheet Reference page precedes Level II and Level III Guide Sheets.

XI. REPLACEMENT COST

A replacement cost for each subsystem type will be contained within the cost estimating system in the Site CAIS.

XII. APPENDICES

Appendix A - Abbreviations

A summary and definition of all abbreviations used in this system are contained in Appendix A which is located at the end of Pavements/Improved Surfaces.

Appendix B - Glossary

A glossary of terms used in this system are contained in Appendix B which is located at the end of Pavements/Improved Surfaces.

Appendix C - Life Cycles

A listing of the average life cycle durations for each assembly* in the Standard.

* Assembly is a term describing the level at which replacement rather than repair occurs. This can be at the subsystem or component designation, depending on the system being surveyed.

19 PAVEMENTS/IMPROVED SURFACES

Note - Facility Manager's Guide

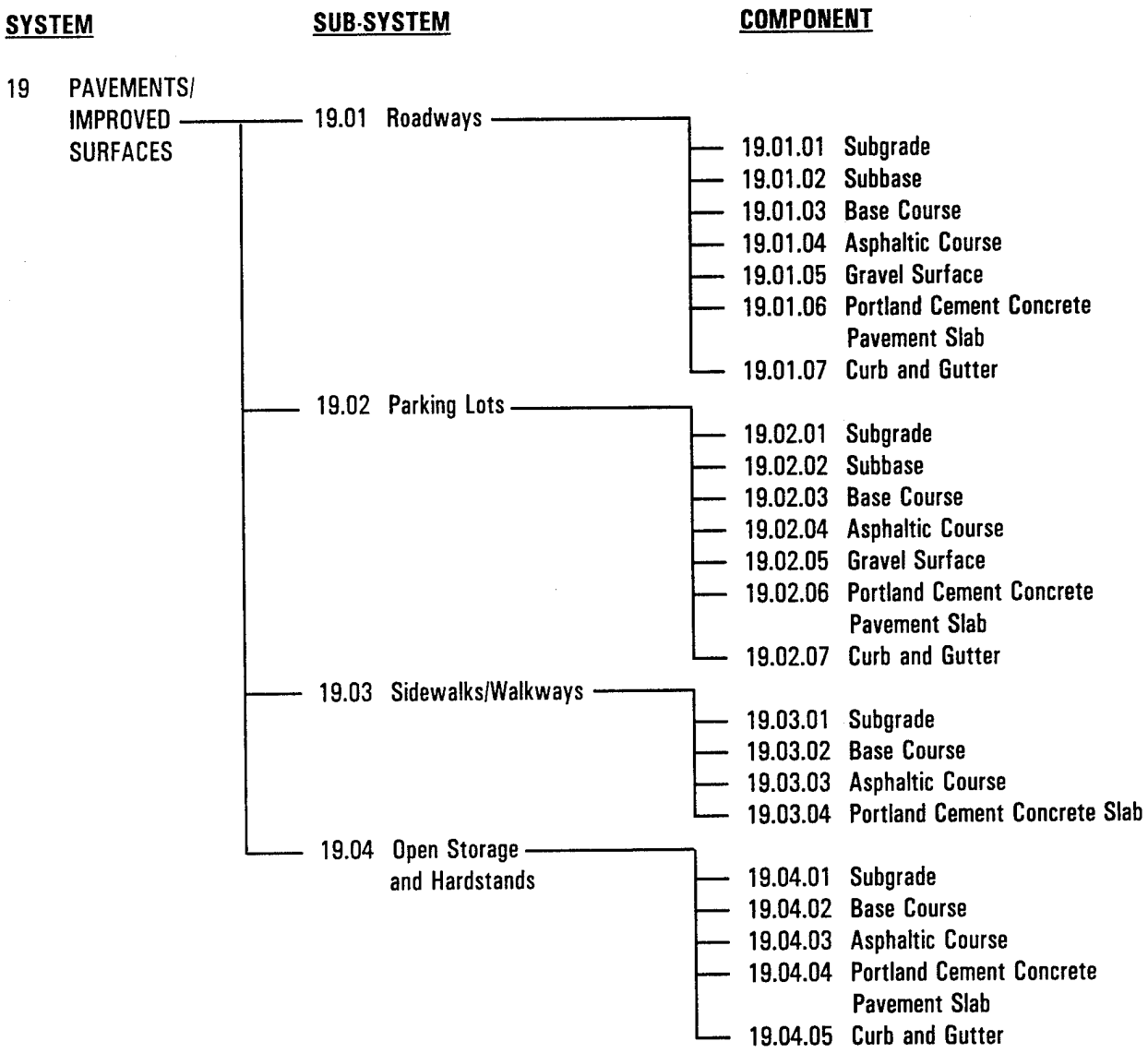
The following are included in the Facility Manager's Guide:

A table showing the required manhours to perform the standard inspection for this facility listed by Cat Code (three digit).

A listing of all Level III inspections with their estimated cost and time to perform. This list will include frequency of inspection for time driven Level III's.

19 PAVEMENTS/IMPROVED SURFACES

Figure 19-A. WORK BREAKDOWN STRUCTURE



19.01 ROADWAYS

DESCRIPTION

Roadways are divided into three types: Asphalt, Gravel and Concrete. Asphalt or flexible pavement structure is a combination of granular subbase, aggregate base course, and asphaltic concrete courses placed on subgrade to support the traffic load and distribute it to the underlying roadbed soils. Concrete or rigid pavement, on the other hand, consists of Portland cement concrete slab built over an aggregate base course and placed on subgrade. Subgrade is either compacted surface of the natural ground or compacted surface of the embankment. Gravel surfaced pavements are another type of flexible pavement.

Both rigid and flexible pavements transfer the load of moving vehicles to the underlying subgrade, but in a differing manner. The load is essentially carried by structural slab in case of the rigid pavement which distributes the load over a relatively wide area of subgrade. Therefore, structural strength of the concrete is the single most important factor in the design of the rigid pavement. The load over the flexible pavement is distributed through the asphaltic and granular layered system and essentially transferred to the subgrade. Hence, the strength of the flexible pavement lies in building up thick layers, with the highest quality materials at or near surface. Thickness of these layers is highly dependent on the strength of the subgrade.

SPECIAL TOOL AND EQUIPMENT REQUIREMENTS

The following list of special tools and equipment, beyond the requirements listed in the Standard Tool Section, shall be developed as required to perform the inspection of the inspection of the pavements:

Lightweight Life Safety Vest
Scale: 12 inches long that reads to ⅛ inch
Straight Edge: 10 feet
Hand Odometer Wheel: To read 0.1 ft
Spray Paint: For marking
Sedan Automobile

SPECIAL SAFETY REQUIREMENTS

The following special safety requirements, beyond those listed in the Master Safety Plan and System Safety Section are necessary to perform the inspection of the Roadways.

Inspectors should utilize the installations notification procedure to secure safe access to the Pavement Inspection Unit. Additional signage may be required in some circumstances based on traffic flow and the Master Safety Plan.

19.01 ROADWAYS

COMPONENT LIST

- 19.01.01 SUBGRADE
- 19.01.02 SUBBASE
- 19.01.03 BASE COURSE
- 19.01.04 ASPHALTIC COURSE
- 19.01.05 GRAVEL SURFACE
- 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB
- 19.01.07 CURB AND GUTTER

RELATED SUBSYSTEMS

Due to the related nature of the elements requiring inspection, the following should be reviewed for concurrent inspection activities.

18.01	AIRFIELD PAVEMENT
23.03	STORM WATER COLLECTION SYSTEM

STANDARD INSPECTION PROCEDURE

The inspection shall be carried out per the standard sequence of components. The inspector will identify types of physical distresses existing in the pavement, and measure the quantity of each distress. The observation contains the description of each distress and guidelines to determine the level of severity. For Level III inspection and testing items, refer to Level III Guide Sheets for inspection procedure.

COMPONENTS

◆ 19.01.01 SUBGRADE

Subgrade is the top surface of a roadbed or embankment upon which the pavement structures are constructed. Subgrade is always covered under various other components of pavement structure. See Level III Guide Sheets for inspection procedures.

◆ 19.01.02 SUBBASE

Subbase is the layer or layers of selected material of designated thickness placed on a subgrade to support a base course. It consists of a compacted layer locally available natural granular material, either treated or untreated. Subbase remains covered under various other pavement components. See Level III Guide Sheets for inspection procedures.

◆ 19.01.03 BASE COURSE

Base Course is the layer or layers of selected material of designed thickness placed on a subbase or a subgrade to support a surface course. Base course material generally consists of high quality processed crushed aggregate. When stabilized base course is required, it may include asphaltic concrete base, portland concrete base, and cement-treated base.

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.03 BASE COURSE (Continued)

Base course is an essential structural component of the flexible pavement. It is, however, not considered a part of the rigid pavement structural thickness and is used for various purposes, such as control of pumping; control of frost action; and drainage.

Base course remains covered beneath pavement surface. See Level III Guide Sheets for inspection procedures.

◆ 19.01.04 ASPHALTIC COURSE

Asphaltic course is the surface course of a flexible pavement structure and consists of a mixture of mineral aggregates and bituminous materials placed in one or more layers to accommodate the traffic load. The top asphaltic layer of flexible pavement is called "wearing course", and in addition to its major function as a structural portion of the pavement, it is designed to resist skidding, traffic abrasion, and the disintegrating effects of climate.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Alligator or Fatigue Cracking:** When two or three levels of severity exist within one distressed area and if these can be easily distinguished from each other, they should be measured and recorded separately. However, if the different levels of severity cannot be easily divided, the entire area should be rated at the highest severity level present.			
Observation:			
a. Longitudinal disconnected hairline cracks running parallel to each other. The cracks are not spalled. Initially there may only be a single crack in the wheel path.	SF		1
***{Severity L}			
b. Further development of low severity alligator cracking into a pattern of pieces formed by cracks that may be lightly surface-spalled.	SF		1
***{Severity M}			
c. Medium alligator cracking has progressed so that pieces are more severely spalled at the edges and loosened until the cells rock under traffic. Pumping may also exist.	SF		1
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Asphalt Bleeding:**			
Observation:			
a. Bleeding has only occurred to a very slight degree and it is noticeable only during a few days a year. Asphalt does not stick to shoes or vehicles. ***{Severity L}	SF		
b. Bleeding has occurred to the extent that asphalt sticks to shoes and vehicles during only a few weeks of the year. ***{Severity M}	SF		
c. Bleeding has occurred extensively and considerable asphalt sticks to shoes and vehicles during at least several weeks of the year. ***{Severity H}	SF		

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Block Cracking**			
Observation:			
a. Blocks are defined by non-sealed cracks that are non-spalled (sides of the crack are vertical) or only minor spalling with a ¼-inch or less mean width.	SF		
***{Severity L}			
b. Blocks are defined by sealed cracks that have a sealant in satisfactory condition to prevent moisture infiltration.	SF		
***{Severity L}			
c. Blocks are defined by sealed or non-sealed cracks that are moderately spalled.	SF		
***{Severity M}			
d. Blocks are defined by non-sealed cracks that are not spalled or have only minor spalling, but have a mean width greater than approximately 1/4-inch.	SF		
***{Severity M}			
e. Blocks are defined by sealed cracks that are not spalled or have only minor spalling, but have sealant in unsatisfactory condition to prevent moisture infiltration.	SF		
***{Severity M}			
f. Blocks are well defined by cracks that are severely spalled.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Bumps and Sags:** If the bump occurs in combination with a crack, the crack is also recorded. Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Bumps and sags cause some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Bumps and sags cause significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Bumps and sags cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		1
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corrugation:** Severity levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Corrugations cause some vibration of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Corrugations cause significant vibration of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Corrugations cause excessive vibration of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	SF		1
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Depression:** Severity level is determined by maximum depth of depression. This depth can be measured by placing a 10-ft straight-edge cross the depressed area and measuring the maximum depth in inches.			
Observation:			
a. Maximum depth of depression is ½ to 1 inch.	SF		
***{Severity L}			
b. Maximum depth of depression is 1 to 2 inches.	SF		
***{Severity M}			
c. Maximum depth of depression is greater than 2 inches.			
***{Severity H}	SF		1

Defect:			
*** Edge Cracking:**			
Observation:			
a. Low or medium severity cracking with no breakup or raveling.	SF		
***{Severity L}			
b. Medium severity cracks with some breakup or raveling.	SF		
***{Severity M}			
c. Considerable breakup or raveling along the edge. Broken pieces may be removable.	SF		1
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Lane/Shoulder Drop-off or Heave**			
Severity level is determined by computing the mean difference in elevation between the traffic lane and the shoulder every 100 feet.			
Observation:			
a. Less than ½ in.	LF		
***{Severity L}			
b. ½ - 1 in.	LF		
***{Severity M}			
c. Greater than 1 in.	LF		
***{Severity H}			

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Lane/Shoulder Joint Separation**			
Severity level is determined by the mean joint opening. No severity level is counted if the joint is well sealed to prevent moisture intrusion. Measure at 50 ft intervals.			
Observation:			
a. Less than ⅛ in.	LF		
***{Severity L}			
b. Greater than ⅛ - ⅜ in.	LF		
***{Severity M}			
c. Greater than ⅜.	LF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal and Transverse Cracking:** The vehicle used to determine bump severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Non-sealed cracks have either minor spalling or no spalling; the cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Sealed cracks have either minor spalling or no spalling; cracks are of any width, but their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. No significant bump occurs when a vehicle crosses the crack.	LF		
***{Severity L}			
d. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
e. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
f. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
g. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
h. The crack causes a significant bump to a vehicle.	LF		
***{Severity M}			
i. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		1
***{Severity H}			
j. The crack causes a severe bump to a vehicle.	LF		1
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration:** The vehicle used to determine patch condition severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Patch is in very good condition and is performing satisfactorily.	SF		
***{Severity L}			
b. Patch is somewhat deteriorated, having low to medium levels of any types of distress.	SF		
***{Severity M}			
c. The patch causes a significant bump to a vehicle.	SF		
***{Severity M}			
d. Patch is badly deteriorated and soon needs replacement.	SF		
***{Severity H}			
e. The patch causes a severe bump to a vehicle.	SF		
***{Severity H}			
Defect:			
*** Polished Aggregate:** The existence of polishing can be detected by both visually observing and running the fingers over the surface.			
Observation:			
a. Aggregate extending above the pavement is negligible, and the surface aggregate is smooth to the touch.	SF		
***{Severity L}			
b. Pavement surface is smooth and has a distinctive dull finish.	SF		
***{Severity M}			
c. Pavement surface appears highly smooth and the aggregate are highly polished.	SF		3
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Potholes:**			
Observation:			
a. Pothole area up to 3 SF and depth less than 1 inch.	EA		
***{Severity L}			
b. Pothole area up to 3 SF and depth between 1 and 2 inches.	EA		
***{Severity M}			
c. Pothole area more than 3 SF and depth less than 1 inch.	EA		
***{Severity M}			
d. Pothole area less than 1 SF and depth more than 2 inches.	EA		
***{Severity M}			
e. Pothole area between 1 and 3 SF and depth more than 2 inches.	EA		
***{Severity H}			
f. Pothole area more than 3 SF and depth more than 1 inch.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Pumping and Water Bleeding:**			
Observation:			
a. Water bleeding exists or water pumping can be observed when heavy loads pass over the pavement; however, no fines (or only a very small amount) can be seen on the surface of the pavement.	SF		
***{Severity L}			
b. Some pumped material can be observed near cracks in the pavement surface.	SF		
***{Severity M}			
c. A significant amount of pumped material exists on the pavement surface near the cracks.	SF		1
***{Severity H}			
Defect:			
*** Ravelling and Weathering:**			
Observation:			
a. Aggregate or binder has started to wear away but has not progressed significantly.	SF		
***{Severity L}			
b. Aggregate and/or binder has worn away and the surface texture is moderately rough and pitted. Loose particles generally exist.	SF		
***{Severity M}			
c. Aggregate and/or binder has worn away and the surface texture is severely rough and pitted.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Reflection Cracking** The vehicle used to determine bump is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Cracks have either minor spalling or no spalling. Non-sealed cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Cracks have either minor spalling or no spalling. Cracks are sealed and of any width, both their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. No significant bump occurs when a vehicle crosses the crack.	LF		
***{Severity L}			
d. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
e. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
f. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
g. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
h. The crack causes a significant bump to a vehicle.	LF		
***{Severity M}			
i. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		
***{Severity H}			
j. The crack causes a severe bump to a vehicle.	LF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Rutting:** Rutting severity is determined by the mean depth of the rut. To determine the mean depth, a 4-foot straight edge should be laid across the rut and the maximum depth measured. The mean depth should be computed from measurements taken every 20 feet along the length of the rut.			
Observation: Mean Rut Depth Criteria			
a. ¼ - ½ in.	SF		
***{Severity L}			
b. Greater than ½ - 1 in.	SF		1
***{Severity M}			
c. Greater than 1 in.	SF		1
***{Severity H}			

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Shoving:** Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Shove causes some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Shove causes significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Shove causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Slippage Cracking:**			
Observation:			
a. Slippage crack exists.	SF		
***{Severity H}			
Defect:			
*** Swelling:** Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Swells cause some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Swells cause significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Swells cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.05 GRAVEL SURFACE

Roadways which are least travelled, temporary roadways, some of the parking and storage areas, and heavy equipment tracks are sometimes constructed with gravel surface. Gravel surface is a layer of variable thickness, and consists of well graded granular aggregate either found in natural condition or processed to meet the requirements.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Improper Cross Section:**			
Observation:	LF		
a. Small amounts of ponding water or evidence of ponding water on the road surface.			
***{Severity L}	LF		
b. The road surface is completely flat (no cross-slope).			
***{Severity L}	LF		
c. Moderate amounts of ponding water or evidence of ponding water on the road surface.			
***{Severity M}	LF		
d. The road surface is bowl-shaped.			
***{Severity M}	LF		
e. Large amounts of ponding water or evidence of ponding water on the road surface.			
***{Severity H}	LF		
f. The road surface contains severe depressions.			
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Inadequate Roadside Drainage:**			
Observation:	LF		
a. Small amounts of ponding water or evidence of ponding in the ditches.			
***{Severity L}	LF		
b. Small amount of overgrowth or debris in the ditches.			
***{Severity L}	LF		
c. Moderate amounts of ponding water or evidence of ponding water on the road surface.			
***{Severity M}	LF		
d. Moderate overgrowth or debris in the ditches.			
***{Severity M}	LF		
e. Moderate erosion of the ditches into shoulders or roadway.			
***{Severity M}	LF		
f. Large amounts of ponding water or evidence of ponding water in the ditches.			
***{Severity H}	LF		
g. Large amounts of water running across or down the road.			
***{Severity H}	LF		
h. Large overgrowth or debris in the ditches.			
***{Severity H}	LF		
i. Large erosion of the ditches into the shoulders or roadway.			
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corrugations:**			
Observation:			
a. Corrugations are less than 1 inch deep.	SF		
***{Severity L}			
b. Corrugations are between 1 and 3 inches deep.	SF		
***{Severity M}			
c. Corrugations are deeper than 3 inches.	SF		
***{Severity H}			
Defect:			
*** Dust:**			
Drive a vehicle at 25 miles per hour or observe a passing vehicle and watch the dust cloud.			
Observation:			
a. Normal traffic produces a thin dust that does not obstruct visibility	SF		
***{Severity L}			
b. Normal traffic produces a moderately thick cloud that partially obstructs visibility and causes traffic to slow down.	SF		
***{Severity M}			
c. Normal traffic produces a very thick cloud that severely obstructs visibility and causes traffic to slow down significantly or stop.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Potholes:** If the potholes are over 3 feet in diameter, the area should be determined in SF and divided by 7 to find the equivalent number of potholes.	EA		
Observation:			
a. Pothole diameter less than 2 feet max., depth less than 2 inches.	EA		
***{Severity L}			
b. Pothole diameter less than 1 foot max., depth less than 4 inches.	EA		
***{Severity L}			
c. Pothole diameter equal to or greater than 2 feet max., depth less than 2 inches.	EA		
***{Severity M}			
d. Pothole diameter less than 2 feet max., depth equal to or less than 4 inches.	EA		
***{Severity M}	EA		
e. Pothole diameter less than 1 foot max., depth greater than 4 inches.			
***{Severity M}	EA		
f. Pothole diameter equal to or greater than 2 feet max., depth equal to or less than 4 inches.			
***{Severity H}	EA		
g. Pothole diameter equal to or greater than 1 foot max., depth greater than 4 inches.			
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Rutting:**			
Observation:			
a. Ruts are less than 1 inch deep.	SF		
***{Severity L}			
b. Ruts are between 1 and 3 inches deep.	SF		
***{Severity M}			
c. Ruts are deeper than 3 inches.	SF		
***{Severity H}			

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Loose Aggregate:**			
Observation:			
a. Loose aggregate on the road surface.	LF		
***{Severity L}			
b. Aggregate berm less than 2 inches deep on the shoulder or less travelled area.	LF		
***{Severity L}			
c. A large amount of loose aggregate on the road surface.	LF		
***{Severity M}			
d. Aggregate berm between 2-4 inches deep on the shoulder or less travelled area.	LF		
***{Severity M}			
e. Aggregate berm greater than 4 inches deep on the shoulder or less travelled area.	LF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB

The basic materials in the pavement slab are portland cement concrete, reinforcing steel, load transfer devices, and joint sealing materials.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Blow-up:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Blow-up has occurred, but only causes some bounce of the vehicle which creates no discomfort. ***{Severity L}	EA		
b. Blow-up causes a significant bounce of the vehicle which creates some discomfort. Temporary patching may have been placed because of the blow-up. ***{Severity M}	EA		
c. Blow-up causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety. ***{Severity H}	EA		

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corner Break:**			
Observation:			
a. Crack is tight (hairline). Well-sealed cracks are considered tight. No faulting or breakup of broken corner exists. Crack is not spalled.	EA		
***{Severity L}			
b. Crack is working and spalled at medium severity, but break-up of broken corner has not occurred. Faulting of crack or joint is less than ½ inch. Temporary patching may have been placed because of corner break.	EA		
***{Severity M}			
c. Crack is spalled at high severity, the corner piece has broken into two or more pieces, or faulting of crack or joint is more than ½ inch.	EA		
***{Severity H}			
Defect:			
*** Depression:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Depression causes a distinct bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Depression causes a significant bounce of the vehicle which creates some discomfort.	EA		
***{Severity M}			
c. Depression causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		2
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

♦ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:

	UOM	LEVEL II KEY	LEVEL III KEY
***Divided Slab/Shattered Slab:** If the slab is measured to have medium- or high-severity deficiency, no other distress is counted.			
Observation:			
a. Slab is broken into four to eight pieces with all cracks of low-severity.	EA		
***{Severity L}			
b. Slab is broken into four to eight pieces with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab is broken into more than eight pieces with all cracks of low-severity.	EA		
***{Severity M}			
d. Slab is broken into four or five pieces with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slab is broken into six to eight pieces with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab is broken into more than eight pieces with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Durability Cracking:** Different severity levels are counted and recorded separately. "D" cracking should not be counted if the fine crack pattern has not developed near cracks, joints and free edges. Popouts and discoloration of joints, cracks and free edges may occur without "D" cracking.			
Observation:			
a. The characteristic pattern of closely spaced fine cracks has developed near joints, cracks, and/or free edges; however, the width of the affected area is generally less than 12 inches wide at the center of the lane in transverse cracks and joints. The crack pattern may fan out at the intersection of transverse cracks/joints with longitudinal cracks/joints. No joint/crack spalling has occurred, and no patches have been placed for "D" cracking.	EA		
***{Severity L}			
b. The characteristic pattern of closely spaced cracks has developed near the crack, joint or free edge and is generally wider than 12 inches at the center of the lane in transverse cracks and/or joints.	EA		
***{Severity M}			
c. Low-or medium-severity joint/crack or corner spalling has developed in the affected area.	EA		
***{Severity M}			
d. Temporary patches have been placed due to "D" cracking-induced spalling.	EA		
***{Severity M}			
e. The pattern of fine cracks has developed near joints or cracks and a high severity level of spalling at joints/cracks exists and considerable material is loose in the affected area.	EA		
***{Severity H}			
f. The crack pattern has developed generally over the entire slab area between cracks and/or joints.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Faulting of Transverse Joints and Cracks:** Faulting is determined by measuring the difference in elevation of slabs at transverse joints for the slabs in the sample unit. Faulting of cracks is measured as a guide to determine the distress level of the crack. Faulting is measured 1 foot in from the outside (right) slab on all lanes except the innermost passing lane. Faulting is measured 1 foot in from the inside (left) slab edge on the inner passing lane. If temporary patching prevents measurement, proceed on to the next joint. Faulting is always positive and is measured in the direction of traffic flow.			
Observation: Difference in elevation per each slab:			
a. Less than ⅜ inch	EA		
***{Severity L}			
b. ⅜ to ¾ inch	EA		
***{Severity M}			
c. Greater than ¾ inch	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Joint Load Transfer System Associated Deterioration:**			
Observation:			
a. Hairline (tight) crack with no spalling or faulting or well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. The crack has opened to a width less than 1 inch.	EA		
***{Severity M}			
c. The crack has faulted less than ½ inch.	EA		
***{Severity M}			
d. The crack may have spalled to a low- or medium-severity level.	EA		
***{Severity M}			
e. The area between the crack and joint has started to break up but pieces have not been dislodged to the point that a tire damage or safety hazard is present.	EA		
***{Severity M}			
f. Temporary patches have been placed due to this joint deterioration.	EA		
***{Severity M}			
g. A crack with width of opening greater than 1 inch.	EA		2
***{Severity H}			
h. A crack faulted ½ inch or more.	EA		2
***{Severity H}			
i. A crack with a high-severity level of spalling.	EA		2
***{Severity H}			
j. The area between the crack and joint has broken up and pieces have been dislodged to the point that a tire damage or safety hazard is present.	EA		2
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Joint Seal Damage of Transverse Joints:**			
Observation:			
a. Joint sealant is in good condition throughout the section with only a minor amount of any of the six types of damage present (as described in Appendix B). Little water and no incompressible materials can infiltrate through the joint.	EA		
***{Severity L}			
b. Joint sealant is in fair condition over the entire surveyed section, with one or more of the six types of damage (as described in Appendix B) occurring to a moderate degree. Water can infiltrate the joint fairly easily; some incompressible materials can infiltrate the joint.	EA		
***{Severity M}			
c. Sealant needs replacement within 1 to 3 years.	EA		
***{Severity M}			
d. Joint sealant is in poor condition over most of the sample unit, with one or more of the six types of damage (as described in Appendix B) occurring to a severe degree. Water and incompressible materials can freely infiltrate the joint.	EA		
***{Severity H}			
e. Sealant needs immediate replacement.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Lane Shoulder Drop-off or Heave:** Lane/shoulder drop-off or heave is measured in the sample unit at all joints when joint spacing is greater than 50 feet, and at every third joint when spacing is less than 50 feet. It is also measured at mid-slab in each slab measured at the joint. The mean difference in elevation is computed from the data and used to determine severity level. Measurements at joints are made 1 foot from the transverse joint on the slab only on the outer lane/shoulder.			
Observation: Elevation difference is:			
a. Between 1 to 2 inches.	EA		
***{Severity L}			
b. Between 2 to 4 inches.	EA		
***{Severity M}			
c. More than 4 inches.	EA		
***{Severity H}			

Defect:

*** Lane Shoulder Joint Separation:**
Separation is measured near transverse joints and at mid-slab. The mean separation is used to determine the severity level. No severity-level is recorded if the joint is tightly sealed.

Observation:

a. Some opening, but less than or equal to ⅛ inch.	EA		
***{Severity L}			
b. More than ⅛ inch but equal to or less than ⅜ inch opening.	EA		
***{Severity M}			
c. More than ⅜ inch opening.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal Cracks:**			
Observation:	LF		
a. Hairline (tight) crack with no spalling or faulting, or a well-sealed crack with no visible faulting or spalling.			
***{Severity L}	LF		
b. A crack with a width between 3/8 and 3/4 inch; and with a medium or low severity spalling and/or faulting less than 1/2 inch.			
***{Severity M}	LF		2
c. A crack with width greater than 1 inch; a crack with a high-severity level of spalling; or a crack faulted 1/2 inch or more.			
***{Severity H}			
Defect:			
*** Longitudinal Joint Faulting:**			
Observation:			
Difference in elevation:			
a. 1/8 to 3/8 inch	EA		
***{Severity L}			
b. 3/8 to 3/4 inch	EA		
***{Severity M}			
c. Greater than 3/4 inch	EA		
***{Severity H}			
Defect:			
*** Scaling:**			
Observation:			
a. Scaling is noticeable	SF		
***{Severity L}			
b. Peeling away of surface mortar flakes over coarse aggregate, less than 50 cavities per 9 SF	SF		
***{Severity M}			
c. Disintegration of surface mortar	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration** The size of patches within each sample unit are recorded. The SF of patches at different severity levels are recorded separately. Patch is rated low severity even if it is in excellent condition.			
Observation:			
a. Patch has little or no deterioration. Some low severity spalling of the patch edges may exist.	SF		
***{Severity L}			
b. Faulting across the slab-patch joints must be less than ¼ inch.	SF		
***{Severity L}			
c. Patch has cracked (low-severity level) and/or some spalling of medium-severity level exists around the edges.	SF		
***{Severity M}			
d. Minor rutting may be present. Faulting of ¼ to ¾ inch exists. Temporary patches may have been placed because of permanent patch deterioration.	SF		
***{Severity M}			
e. Patch has deteriorated by spalling, rutting or cracking within the patch to a condition which requires replacement.	SF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Popouts:** The density of popouts can be determined by counting the number of popouts per 9 SF of slab surface. The average popout density must exceed approximately one popout per 9 SF over the entire slab area before they are counted as a distress.			
Average popout density over the entire slab: Observation:			
a. 1 to 5 popouts per 9 SF.	EA		
***{Severity L}			
b. 6-10 popouts per 9 SF.	EA		
***{Severity M}			
c. Greater than 10 popouts per 9 SF.	EA		
***{Severity H}			
Defect:			
*** Pumping and Water Bleeding:**			
Observation:			
a. Water is forced out of a joint or crack when vehicles pass over the joints or cracks; water is forced out of the lane/shoulder longitudinal joint when vehicles pass along the joint; or water bleeding exists. No fines can be seen on the surface of the traffic lanes or shoulder.	LF		
***{Severity L}			
b. A small amount of pumped material can be observed near some of the joints or cracks on the surface of the traffic lane or shoulder.	LF		
***{Severity M}			
c. A significant amount of pumped materials exist on the pavement surface of the traffic lane or shoulder along the joints or cracks.	LF		2
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Map Cracking or Crazing:**			
Observation:			
a. Crazing or map cracking exists but is barely noticeable; the surface is in good condition with no scaling.	SF		
***{Severity L}	SF		
b. Crazing or map cracking noticeable over the whole area; scaling exists.			
***{Severity M}			
c. Well pronounced crazing or map cracking over the whole area; scaling exists.	SF		
***{Severity H}			
Defect:			
*** Spalling (Transverse Joint/Crack):** Spalling is measured by counting and recording separately the number of joints with each severity level. If more than one level of severity exists along a joint, all will be recorded as highest severity level present. Spalling of cracks should not be recorded except when the spalling is caused by "D" cracking. The spalling of cracks is included in rating severity levels of cracks.			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing, but the spalled area does not present a vehicular hazard. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}			
c. The joint is severely spalled to the extent that a vehicular hazard exists.			
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

♦ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Spalling (Longitudinal Joint/Crack):** Spalling is measured by counting and recording separately the number of joints with each severity level. If more than one level of severity exists along a joint, all will be recorded as the highest severity level present. Spalling of cracks should not be recorded except when spalling is caused by "D" cracking. The spalling of cracks is included in rating severity levels of cracks.			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing, but the spalled area does not present a vehicular hazard. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}			
c. The joint is severely spalled to the extent that a vehicular hazard exists.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Spalling (corner):**			
Observation:			
a. The spall is not broken into pieces and is in place and not loose.	EA		
***{Severity L}			
b. One of the following conditions exists: Spall is broken into pieces; cracks are spalled; some or all pieces are loose or missing but do not present potential vehicular damage; or spall is patched.	EA		
***{Severity M}			
c. Pieces of spall are missing to the extent that the hole may cause vehicular damage.	EA		
***{Severity H}			
Defect:			
*** Swelling:** Severity levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Swell causes a distinct bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Swell causes significant bounce of the vehicle which creates some discomfort.	EA		
***{Severity M}			
c. Swell causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Transverse and Diagonal Cracks:** If the crack does not have the same severity level along the entire length, the crack is rated at the highest severity present.			
Observation:			
a. Hairline (tight) crack with no spalling or faulting, a well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. A crack with a width of between 3/8 - 3/4 inch; and a low- to medium-severity level of spalling.	EA		
***{Severity M}			
c. Faulting less than ½ inch. Temporary patching may be present.	EA		
***{Severity M}			
d. A crack with width of greater than 1 inch.	EA		2
***{Severity H}			
e. A crack with a high-severity level of spalling; or a crack faulted ½ inch or more.	EA		2
***{Severity H}			
Defect:			
*** Polished Aggregate:** The existence of polishing can be detected by both visually observing and running the fingers over the surface.			
Observation:			
a. Aggregate extending above the pavement is negligible, and the surface aggregate is smooth to the touch.	SF		
***{Severity L			
b. Pavement surface is smooth and has a distinctive dull finish.	SF		
***{Severity M}			
c. Pavement surface appears highly smooth and the aggregate are highly polished.	SF		4
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Punchout:** If a slab contains one or more punchouts, it is counted as containing a punchout at the severity level of the most severe punchout.			
Observation:			
a. Slab contains two to five punchouts with some or all cracks of low-severity.	EA		
***{Severity L}			
b. Slab contains two to five punchouts with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab contains five or more punchouts with all cracks of low-severity.	EA		
***{Severity M}			
d. Slabs contain two or three punchouts with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slabs contain four or five punchouts with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab contain five or more punchouts with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			
Defect:			
*** Shrinkage Cracking:**			
Observation:			
a. Shrinkage cracks are visible with no raveling.	EA		
***{Severity L}			
b. Shrinkage cracks are clearly visible with some raveling evident.	EA		
***{Severity M}			
c. Shrinkage cracks have raveled or spalled.	EA		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.07 CURB AND GUTTER

Curb and gutter is a barrier constructed at the pavement edge to channel water runoff from pavement to the drainage system. Besides controlling drainage the curbs and gutters are also used to deter vehicles from leaving the roadway. Curbs and gutters may be either precast, cast-in-place concrete, formed of asphaltic concrete, stone, or masonry.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Cracks:**			
Observation:			
a. Transverse cracks less than 1/2 inch wide; and longitudinal cracks on gutters less than 1/4 inch wide.	LF		
***{Severity L}			
b. Transverse cracks between 1/2-3/4 inch wide; and longitudinal cracks on gutters between 1/4-1/2 inch wide.	LF		
***{Severity M}			
c. Transverse cracks more than 3/4 inch wide; and longitudinal cracks on gutters more than 1/2 inch wide.	LF		
***{Severity H}			

19.01 ROADWAYS

COMPONENTS (Continued)

◆ 19.01.07 CURB AND GUTTER (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
* **Tilting:**			
Observation:			
a. Unit has started to tilt away from the roadway, less than 1 inch movement.	LF		
***{Severity L}			
b. Earth support at the curb end has eroded and the unit has tilted by 1 inch ore more.	LF		
***{Severity M}			
c. Unit has tilted in excess of 6 inches.	LF		
***{Severity H}			
Defect:			
* **Spalling:**			
Observation:			
a. Depressions greater than 1 inch deep and greater than 6 inches in diameter or spall does not extend more than 3 inches on either side of crack.	EA		
***{Severity L}			
b. Depressions greater than 1 inch deep and greater than 6 inches in diameter with corroded re-bars.	EA		
***{Severity M}			
c. Spalls extend more than 3 inches on either side of cracks. Some pieces may be loose.	EA		
***{Severity M}			
d. Depressions, joints, and cracks have severely spalled.	EA		
***{Severity H}			

19.01 ROADWAYS

REFERENCES

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User,s Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

7. TM 5-626, Unsurfaced Road Maintenance Management, (Being Revised)

19.01 ROADWAYS

LEVEL II KEY	GUIDE SHEET CONTROL NUMBER
N/A	

LEVEL III KEY	GUIDE SHEET CONTROL NUMBER
1	GS-III 19.01.04-1
2	GS-III 19.01.06-2
3	GS-III 19.01.04-3
4	GS-III 19.01.06.4

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.01.04-1

Application

This guide applies to investigation and testing of asphaltic concrete roadways to determine their structural capacity and remaining pavement life.

Special Safety Requirements

Passing traffic is a hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems of the base, its analyses, however, cannot determine structural capacity of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of Non-Destructive Testing (NDT) Techniques to measure pavement deflection, and partially destructive testing of one or more pavement components to determine component properties and strength. NDT equipment include:

- Benkleman Beam
- Dynaflect
- Falling Weight Deflectometer

NDT technique can be used to detect voids under the pavement by the use of Ground Penetrating Radar equipment and Infrared Thermography Method. Partially destructive techniques include sample coring through asphalt pavements to determine thickness, strength, and composition.

Special Tools and Equipment

Standard testing equipment required to perform the NDT and/or partially destructive testing.

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1 (Continued)

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.01.04-1

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Alligator or Fatigue Cracking.
- Bumps and Sags
- Corrugation
- Depression
- Edge Cracking
- Longitudinal and Transverse Cracking
- Pumping and Water Bleeding
- Rutting

References

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User,s Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 2

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.01.06-2

Application

This guide applies to investigation and testing of portland concrete roadways to determine their structural capacity and remaining pavement life.

Special Safety Requirements

Passing traffic is a hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems of the base, its analyses, however, cannot determine structural capacity of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of Non-Destructive Testing (NDT) Techniques to measure pavement deflection, and partially destructive testing of one or more pavement components to determine component properties and strength. NDT equipment include:

- Benkleman Beam
- Dynaflect
- Falling Weight Deflectometer

NDT technique can be used to detect voids under the pavement by the use of Ground Penetrating Radar equipment and Infrared Thermography Method. Partially destructive techniques include sample coring through concrete pavements to determine thickness, strength, and composition.

Special Tools and Equipment

Standard testing equipment required to perform the NDT and/or partially destructive testing.

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 2 (Continued)

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.01.06-2

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Depression
- Joint Load Transfer System Associated Deterioration
- Longitudinal Cracks
- Transverse and Diagonal Cracks
- Pumping and Water Bleeding

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 3

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.01.04-3

Application

This guide applies to investigation and testing of asphaltic concrete roadways to determine their skid resistance potential.

Special Safety Requirements

Passing traffic is hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems, its analyses, however, may not determine skid resistance potential of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of special equipment to measure skid resistance. These equipments and methods are outlined in "Literature Review of Skid-Measuring Equipment and Techniques, Misc.", a U.S. Army Engineer Waterway Experiment Station publication.

Special Tools and Equipment

Standard testing equipment are required to perform the skid resistance test.

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Polished Aggregate

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO.3 (Continued)

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.01.04-3

References

1. AASHTO Guide for Design of Pavement Structures, 1986
2. TM 5-623, Pavement Maintenance Management, November 1982
3. Principals of Pavement Design, E.J. Yoder, John Wiley & Sons, Inc.
4. Micro PAVER, User's Guide, Version 3.0, U.S. Army corps of Engineers, Construction Engineering Research Laboratory, January 1992
5. ASTM D 5340 - 93, Standard Test method for Airport Pavement Condition Index Surveys
6. TM 5-826-6/AFR 93-5, Procedures for U.S. Army and U.S. Air Force Airfield Condition Surveys, July 1989
7. H.A. Joseph and R.A. Andreas, "Literature Review of Skid-Measuring Equipment and Techniques, Misc." Paper 5-73-28 (U.S. Army Engineer Waterways Experiment Station, 1972)

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 4

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.01.06-4

Application

This guide applies to investigation and testing of portland cement concrete roadways to determine their skid resistance potential.

Special Safety Requirements

Passing traffic is hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems, its analyses, however, may not determine skid resistance potential of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of special equipment to measure skid resistance. These equipments and methods are outlined in "Literature Review of Skid-Measuring Equipment and Techniques, Misc.", a U.S. Army Engineer Waterway Experiment Station publication.

Special Tools and Equipment

Standard testing equipment are required to perform the skid resistance test.

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Polished Aggregate

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 4 (Continued)

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.01.06-4

References

1. AASHTO Guide for Design of Pavement Structures, 1986
2. TM 5-623, Pavement Maintenance Management, November 1982
3. Principals of Pavement Design, E.J. Yoder, John Wiley & Sons, Inc.
4. Micro PAVER, User's Guide, Version 3.0, U.S. Army corps of Engineers, Construction Engineering Research Laboratory, January 1992
5. ASTM D 5340 - 93, Standard Test method for Airport Pavement Condition Index Surveys
6. TM 5-826-6/AFR 93-5, Procedures for U.S. Army and U.S. Air Force Airfield Condition Surveys, July 1989
7. H.A. Joseph and R.A. Andreas, "Literature Review of Skid-Measuring Equipment and Techniques, Misc." Paper 5-73-28 (U.S. Army Engineer Waterways Experiment Station, 1972)

19.02 PARKING LOTS

DESCRIPTION

Pavement for parking areas consist of asphalt, concrete and gravel surfaced paved areas. Asphalt or flexible pavement structure is a combination of granular subbase, aggregate base course, and asphaltic concrete courses placed on subgrade to support the traffic load and distribute it to the underlying roadbed soils. Concrete or rigid pavement, on the other hand, consists of Portland Cement concrete slabs built over an aggregate base course and placed on subgrade. Subgrade is either compacted surface of the natural ground or compacted surface of the embankment. Gravel surfaced pavements are another type of flexible pavement.

Flexible pavements transfer the load of moving vehicles to the underlying subgrade. The load is essentially carried by structural slab in case of the rigid pavement which distributes the load over a relatively wide area of subgrade. Therefore, structural strength of the concrete is the single most important factor in the design of the rigid pavement. The load over the flexible pavement is distributed through the asphaltic and granular layered system and essentially transferred to the subgrade. Hence, the strength of the flexible pavement lies in building up thick layers, with the highest quality materials at or near surface. Thickness of these layers is highly dependent on the strength of the subgrade.

SPECIAL TOOL AND EQUIPMENT REQUIREMENTS

The following list of special tools and equipment, beyond the requirements listed in the Standard Tool Section, shall be developed as required to perform the inspection of the pavements:

Lightweight Life Safety Vest
Scale: 12 inches long that reads to 1/8 inch
Straight Edge: 10 feet
Hand Odometer Wheel: To read 0.1 ft
Spray Paint: For marking
Sedan Automobile

SPECIAL SAFETY REQUIREMENTS

Since the inspection is performed by walking over the pavement, passing traffic is a hazard. The inspection must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access in coordination with installation for required safety traffic signage. Inspector will be required to wear international orange safety vests.

19.02 PARKING LOTS

COMPONENT LIST

- 19.02.01 SUBGRADE
- 19.02.02 SUBBASE
- 19.02.03 BASE COURSE
- 19.02.04 ASPHALTIC COURSE
- 19.02.05 GRAVEL SURFACE
- 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB
- 19.02.07 CURB AND GUTTER

RELATED SUBSYSTEMS

Due to the related nature of the elements requiring inspection, the following should be reviewed for concurrent inspection activities.

18.01	AIRFIELD PAVEMENT/DRAINAGE
23.03	STORM WATER COLLECTION SYSTEM

STANDARD INSPECTION PROCEDURE

The inspection shall be carried out for each pavement type listed. The inspector will identify types of physical distresses existing in the pavement, and measure the quantity of each distress. The observation contains the description of each distress and guidelines to determine the level of severity. For Level III inspection and testing items, refer to Level III Guide Sheets for inspection procedure.

19.02 PARKING LOTS

COMPONENTS

◆ 19.02.01 SUBGRADE

Subgrade is the top surface of a roadbed or embankment upon which the pavement structures are constructed. Subgrade is always covered under various other components of pavement structure. See Level III Guide Sheets for inspection procedures.

◆ 19.02.02 SUBBASE

Subbase is the layer or layers of selected material of designated thickness placed on a subgrade to support a base course. It consists of a compacted layer locally available natural granular material, either treated or untreated. Subbase remains covered under various other pavement components. See Level III Guide Sheets for inspection procedures.

◆ 19.02.03 BASE COURSE

Base Course is the layer or layers of selected material of designed thickness placed on a subbase or a subgrade to support a surface course. Base course material generally consists of high quality processed crushed aggregate. When stabilized base course is required, it may include asphaltic concrete base, portland concrete base, and cement-treated base.

Base Course is an essential structural component of the flexible pavement. It is, however, not considered a part of the rigid pavement structural thickness and is used for various purposes, such as control of pumping; control of frost action; and drainage.

Base Course remains covered beneath pavement surface. See Level III Guide Sheets for inspection procedures.

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE

Asphaltic course is the surface course of a flexible pavement structure and consists of a mixture of mineral aggregates and bituminous materials placed in one or more layers to accommodate the traffic load. The top asphaltic layer of flexible pavement is called "wearing course", and in addition to its major function as a structural portion of the pavement, it is designed to resists skidding, traffic abrasion, and the disintegrating effects of climate.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Alligator or Fatigue Cracking:** When two or three levels of severity exist within one distressed area and if these can be easily distinguished from each other, they should be measured and recorded separately. However, if the different levels of severity cannot be easily divided, the entire area should be rated at the highest severity level present.			
Observation:			
a. Longitudinal disconnected hairline cracks running parallel to each other. The cracks are not spalled. Initially there may only be a single crack in the wheel path.	SF		1
***{Severity L}			
b. Further development of low-severity alligator cracking into a pattern of pieces formed by cracks that may be lightly surface-spalled.	SF		1
***{Severity M}			1
c. Medium alligator cracking has progressed so that pieces are more severely spalled at the edges and loosened until the cells rock under traffic. Pumping may also exist.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Asphalt Bleeding:**			
Observation:			
a. Bleeding has only occurred to a very slight degree and it is noticeable only during a few days a year. Asphalt does not stick to shoes or vehicles. ***{Severity L}	SF		
b. Bleeding has occurred to the extent that asphalt sticks to shoes and vehicles during only a few weeks of the year. ***{Severity M}	SF		
c. Bleeding has occurred extensively and considerable asphalt sticks to shoes and vehicles during at least several weeks of the year. ***{Severity H}	SF		

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Block Cracking:**			
Observation:			
a. Blocks are defined by non-sealed cracks that are non-spalled (sides of the crack are vertical) or only minor spalling with a ¼-inch or less mean width.	SF		
***{Severity L}			
b. Blocks are defined by sealed cracks that have a sealant in satisfactory condition to prevent moisture infiltration.	SF		
***{Severity L}			
c. Blocks are defined by sealed or non-sealed cracks that are moderately spalled.	SF		
***{Severity M}			
d. Blocks are defined by non-sealed cracks that are not spalled or have only minor spalling, but have a mean width greater than approximately 1/4-inch.	SF		
***{Severity M}			
e. Blocks are defined by sealed cracks that are not spalled or have only minor spalling, but have sealant in unsatisfactory condition to prevent moisture infiltration.	SF		
***{Severity M}			
f. Blocks are well defined by cracks that are severely spalled.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Bumps and Sags:** If the bump occurs in combination with a crack, the crack is also recorded. Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Bumps and sags cause some bounce of the vehicle which creates no discomfort. ***{Severity L}	SF		
b. Bumps and sags cause significant bounce of the vehicle which creates some discomfort. ***{Severity M}	SF		
c. Bumps and sags cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety. ***{Severity H}	SF		1

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corrugation:** Severity Levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Corrugations cause some vibration of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Corrugations cause significant vibration of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Corrugations cause excessive vibration of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	SF		1
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal and Transverse Cracking:** The vehicle used to determine bump severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Non-sealed cracks have either minor spalling or no spalling; the cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Sealed cracks have either minor spalling or no spalling; cracks are of any width, but their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. No significant bump occurs when a vehicle crosses the crack.	LF		
***{Severity L}			
d. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
e. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
f. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
g. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
h. The crack causes a significant bump to a vehicle.	LF		
***{Severity M}			
i. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		1
***{Severity H}	LF		1
j. The crack causes a severe bump to a vehicle.			
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Reflection Cracking:** The vehicle used to determine bump is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Cracks have either minor spalling or no spalling. Non-sealed cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Cracks have either minor spalling or no spalling. Cracks are sealed and of any width, both their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. No significant bump occurs when a vehicle crosses the crack.	LF		
***{Severity L}			
d. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
e. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
f. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
g. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
h. The crack causes a significant bump to a vehicle.	LF		
***{Severity M}			
i. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		
***{Severity H}			
j. The crack causes a severe bump to a vehicle.	LF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration:** The vehicle used to determine patch condition severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Patch is in very good condition and is performing satisfactorily.	SF		
***{Severity L}			
b. Patch is somewhat deteriorated, having low to medium levels of any types of distress.	SF		
***{Severity M}			
c. The patch causes a significant bump to a vehicle.	SF		
***{Severity M}			
d. Patch is badly deteriorated and soon needs replacement.	SF		
***{Severity H}			
e. The patch causes a severe bump to a vehicle.	SF		
***{Severity H}			

Defect:

*** Polished Aggregate:**
The existence of polishing can be detected by both visually observing and running the fingers over the surface.

Observation:

a. Aggregate extending above the pavement is negligible, and the surface aggregate is smooth to the touch. — SF
***{Severity L}

b. Pavement surface is smooth and has a distinctive dull finish. — SF
***{Severity M}

c. Pavement surface appears highly smooth and the aggregate are highly polished. — SF
***{Severity H}

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Potholes:**			
Observation:			
a. Pothole area up to 3 SF and depth less than 1 inch.	EA		
***{Severity L}			
b. Pothole area up to 3 SF and depth between 1 and 2 inches.	EA		
***{Severity M}			
c. Pothole area more than 3 SF and depth less than 1 inch.	EA		
***{Severity M}			
d. Pothole area less than 1 SF and depth more than 2 inches.	EA		
***{Severity M}			
e. Pothole area between 1 and 3 SF and depth more than 2 inches.	EA		
***{Severity H}			
f. Pothole area more than 3 SF and depth more than 1 inch.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.04 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Pumping and Water Bleeding:**			
Observation:			
a. Water bleeding exists or water pumping can be observed when heavy loads pass over the pavement; however, no fines (or only a very small amount) can be seen on the surface of the pavement.	SF		
***{Severity L}			
b. Some pumped material can be observed near cracks in the pavement surface.	SF		
***{Severity M}			
c. A significant amount of pumped material exists on the pavement surface near the cracks.	SF		1
***{Severity H}			
Defect:			
*** Ravelling and Weathering:**			
Observation:			
a. Aggregate or binder has started to wear away but has not progressed significantly.	SF		
***{Severity L}			
b. Aggregate and/or binder has worn away and the surface texture is moderately rough and pitted. Loose particles generally exist.	SF		
***{Severity M}			
c. Aggregate and/or binder has worn away and the surface texture is severely rough and pitted.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Rutting:** Rutting severity is determined by the mean depth of the rut. To determine the mean depth, a 4-foot straight edge should be laid across the rut and the maximum depth measured. The mean depth should be computed from measurements taken every 20 feet along the length of the rut.			
Observation: Mean Rut Depth Criteria			
a. ¼ - ½ in. ***{Severity L}	SF		
b. Greater than ½ - 1 in. ***{Severity M}	SF		1
c. Greater than 1 in. ***{Severity H}	SF		1

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Slippage Cracking:**			
Observation:			
a. Slippage crack exists. ***{Severity H}	SF		

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Swelling:** Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Swells cause some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Swells cause significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Swells cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.04 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Edge Cracking:**			
Observation:			
a. Low or medium severity cracking with no breakup or raveling.	SF		
***{Severity L}			
b. Medium severity cracks with some breakup or raveling.	SF		
***{Severity M}			
c. Considerable breakup or raveling along the edge. Broken pieces may be removable.	SF		1
***{Severity H}			

Defect:

*** Shoving:**
Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.

Observation:			
a. Shove causes some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Shove causes significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Shove causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.05 GRAVEL SURFACE

Roadways which are least travelled, temporary roadways, some of the parking and storage areas, and heavy equipment tracks are sometimes constructed with gravel surface. Gravel surface is a layer of variable thickness, and consists of well graded granular aggregate either found in natural condition or processed to meet the requirements.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Improper Cross Section:**			
Observation:			
a. Small amounts of ponding water or evidence of ponding water on the road surface.	LF		
***{Severity L}			
b. The road surface is completely flat (no cross-slope).	LF		
***{Severity L}			
c. Moderate amounts of ponding water or evidence of ponding water on the road surface.	LF		
***{Severity M}			
d. The road surface is bowl-shaped.	LF		
***{Severity M}			
e. Large amounts of ponding water or evidence of ponding water on the road surface.	LF		
***{Severity H}			
f. The road surface contains severe depressions.	LF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Inadequate Roadside Drainage:**			
Observation:			
a. Small amounts of ponding water or evidence of ponding in the ditches.	LF		
***{Severity L}			
b. Small amount of overgrowth or debris in the ditches.	LF		
***{Severity L}			
c. Moderate amounts of ponding water or evidence of ponding water on the road surface.	LF		
***{Severity M}			
d. Moderate overgrowth or debris in the ditches.	LF		
***{Severity M}			
e. Moderate erosion of the ditches into shoulders or roadway.	LF		
***{Severity M}			
f. Large amounts of ponding water or evidence of ponding water in the ditches.	LF		
***{Severity H}			
g. Large amounts of water running across or down the road.	LF		
***{Severity H}			
h. Large overgrowth or debris in the ditches.	LF		
***{Severity H}			
i. Large erosion of the ditches into the shoulders or roadway.	LF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.05 GRAVEL SURFACE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corrugations:**			
Observation:			
a. Corrugations are less than 1 inch deep.	SF		
***{Severity L}			
b. Corrugations are between 1 and 3 inches deep.	SF		
***{Severity M}			
c. Corrugations are deeper than 3 inches.	SF		
***{Severity H}			

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Dust:**			
Drive a vehicle at 25 miles per hour or observe a passing vehicle and watch the dust cloud.			
Observation:			
a. Normal traffic produces a thin dust that does not obstruct visibility	SF		
***{Severity L}			
b. Normal traffic produces a moderately thick cloud that partially obstruct visibility and causes traffic to slow down.	SF		
***{Severity M}			
c. Normal traffic produces a very thick cloud that severely obstruct visibility and causes traffic to slow down significantly or stop.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.05 GRAVEL SURFACE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Potholes:** If the potholes are over 3 feet in diameter, the area should be determined in SF and divided by 7 to find the equivalent number of potholes. Observation:			
a. Pothole diameter less than 2 feet max., depth less than 2 inches. ***{Severity L}	EA		
b. Pothole diameter less than 1 foot max., depth less than 4 inches. ***{Severity L}	EA		
c. Pothole diameter equal to or greater than 2 feet max., depth less than 2 inches. ***{Severity M}	EA		
d. Pothole diameter less than 2 feet max., depth equal to or less than 4 inches. ***{Severity M}	EA		
e. Pothole diameter less than 1 foot max., depth greater than 4 inches. ***{Severity M}	EA		
f. Pothole diameter equal to or greater than 2 feet max., depth equals less than 4 inches. ***{Severity H}	EA		
g. Pothole diameter equal to or greater than 1 foot max., depth greater than 4 inches. ***{Severity H}	EA		

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.05 GRAVEL SURFACE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Rutting:**			
Observation:			
a. Ruts are less than 1 inch deep.	SF		
***{Severity L}			
b. Ruts are between 1 and 3 inches deep.	SF		
***{Severity M}			
c. Ruts are deeper than 3 inches.	SF		
***{Severity H}			

Defect:

*** Loose Aggregate:**			
Observation:			
a. Loose aggregate on the road surface.			
***{Severity L}	LF		
b. Aggregate berm less than 2 inches deep on the shoulder or less travelled area.	LF		
***{Severity L}			
c. A large amount of loose aggregate on the road surface.	LF		
***{Severity M}			
d. Aggregate berm between 2-4 inches deep on the shoulder or less travelled area.	LF		
***{Severity M}			
e. Aggregate berm greater than 4 inches deep on the shoulder or less travelled area.	LF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB

The basic materials in the pavement slab are portland cement concrete, reinforcing steel, load transfer devices, and joint sealing materials.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Blow-up:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Blow-up has occurred, but only causes some bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Blow-up causes a significant bounce of the vehicle which creates some discomfort. Temporary patching may have been placed because of the blow-up.	EA		
***{Severity M}			
c. Blow-up causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corner Break:**			
Observation:			
a. Crack is tight (hairline). Well-sealed cracks are considered tight. No faulting or breakup of broken corner exists. Crack is not spalled.	EA		
***{Severity L}			
b. Crack is working and spalled at medium severity, but break-up of broken corner has not occurred. Faulting of crack or joint is less than ½ inch. Temporary patching may have been placed because of corner break.	EA		
***{Severity M}			
c. Crack is spalled at high severity, the corner piece has broken into two or more pieces, or faulting of crack or joint is more than ½ inch.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Depression:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Depression causes a distinct bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Depression causes a significant bounce of the vehicle which creates some discomfort.	EA		
***{Severity M}			
c. Depression causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		2
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:

***Divided Slab/Shattered Slab:** If the slab is measured to have medium- or high-severity deficiency, no other distress is counted.	**UOM**	**LEVEL II KEY**	**LEVEL III KEY**
Observation:			
a. Slab is broken into four to eight pieces with all cracks of low-severity.	EA		
***{Severity L}			
b. Slab is broken into four to eight pieces with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab is broken into more than eight pieces with all cracks of low-severity.	EA		
***{Severity M}			
d. Slab is broken into four or five pieces with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slab is broken into six to eight pieces with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab is broken into more than eight pieces with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Durability Cracking:** Different severity levels are counted and recorded separately. "D" cracking should not be counted if the fine crack pattern has not developed near cracks, joints and free edges. Popouts and discoloration of joints, cracks and free edges may occur without "D" cracking.			
Observation:			
a. The characteristic pattern of closely spaced fine cracks has developed near joints, cracks, and/or free edges; however, the width of the affected area is generally less than 12 inches wide at the center of the lane in transverse cracks and joints. The crack pattern may fan out at the intersection of transverse cracks/joints with longitudinal cracks/joints. No joint/crack spalling has occurred, and no patches have been placed for "D" cracking.	EA		
***{Severity L}			
b. The characteristic pattern of closely spaced cracks has developed near the crack, joint or free edge and is generally wider than 12 inches at the center of the lane in transverse cracks and/or joints.	EA		
***{Severity M}			
c. Low-or medium-severity joint/crack or corner spalling has developed in the affected area.	EA		
***{Severity M}			
d. Temporary patches have been placed due to "D" cracking-induced spalling.	EA		
***{Severity M}			
e. The pattern of fine cracks has developed near joints or cracks and a high severity level of spalling at joints/cracks exists and considerable material is loose in the affected area.	EA		
***{Severity H}			
f. The crack pattern has developed generally over the entire slab area between cracks and/or joints.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Faulting of Transverse Joints and Cracks:** Faulting is determined by measuring the difference in elevation of slabs at transverse joints for the slabs in the sample unit. Faulting of cracks is measured as a guide to determine the distress level of the crack. Faulting is measured 1 foot in from the outside (right) slab on all lanes except the innermost passing lane. Faulting is measured 1 foot in from the inside (left) slab edge on the inner passing lane. If temporary patching prevents measurement, proceed on to the next joint. Faulting is always positive and is measured in the direction of traffic flow.			
Observation: Difference in elevation per each slab:			
a. Less than ⅜ inch	EA		
***{Severity L}			
b. ⅜ to ¾ inch	EA		
***{Severity M}			
c. Greater than ¾ inch	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Joint Load Transfer System Associated Deterioration:**			
Observation:			
a. Hairline (tight) crack with no spalling or faulting or well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. The crack has opened to a width less than 1 inch.	EA		
***{Severity M}			
c. The crack has faulted less than ½ inch.	EA		
***{Severity M}			
d. The crack may have spalled to a low- or medium-severity level.	EA		
***{Severity M}			
e. The area between the crack and joint has started to break up but pieces have not been dislodged to the point that a tire damage or safety hazard is present.	EA		
***{Severity M}			
f. Temporary patches have been placed due to this joint deterioration.	EA		
***{Severity M}			
g. A crack with width of opening greater than 1 inch.	EA		2
***{Severity H}			
h. A crack faulted ½ inch or more.	EA		2
***{Severity H}			
i. A crack with a high-severity level of spalling.	EA		2
***{Severity H}			
j. The area between the crack and joint has broken up and pieces have been dislodged to the point that a tire damage or safety hazard is present.	EA		2
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Joint Seal Damage of Transverse Joints:**			
Observation:			
a. Joint sealant is in good condition throughout the section with only a minor amount of any of the six types of damage present (as described in Appendix B). Little water and no incompressible materials can infiltrate through the joint.	EA		
***{Severity L}			
b. Joint sealant is in fair condition over the entire surveyed section, with one or more of the six types of damage (as described in Appendix B) occurring to a moderate degree. Water can infiltrate the joint fairly easily; some incompressible materials can infiltrate the joint.	EA		
***{Severity M}			
c. Sealant needs replacement within 1 to 3 years.	EA		
***{Severity M}			
d. Joint sealant is in poor condition over most of the sample unit, with one or more of the six types of damage (as described in Appendix B) occurring to a severe degree. Water and incompressible materials can freely infiltrate the joint.	EA		
***{Severity H}			
e. Sealant needs immediate replacement.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Lane Shoulder Drop-off or Heave:** Lane/shoulder drop-off or heave is measured in the sample unit at all joints when joint spacing is greater than 50 feet, and at every third joint when spacing is less than 50 feet. It is also measured at mid-slab in each slab measured at the joint. The mean difference in elevation is computed from the data and used to determine severity level. Measurements at joints are made 1 foot from the transverse joint on the slab only on the outer lane/shoulder.			
Observation: Elevation difference is:			
a. Between 1 to 2 inches.	EA		
***{Severity L}			
b. Between 2 to 4 inches.	EA		
***{Severity M}			
c. More than 4 inches.	EA		
***{Severity H}			

Defect:

*** Lane Shoulder Joint Separation:**
Separation is measured near transverse joints and at mid-slab. The mean separation is used to determine the severity level. No severity-level is recorded if the joint is tightly sealed.

Observation:

a. Some opening, but less than or equal to 1/8 inch.	EA		
***{Severity L}			
b. More than 1/8 inch but equal to or less than 3/8 inch opening.	EA		
***{Severity M}			
c. More than 3/8 inch opening.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal Cracks:**			
Observation:			
a. Hairline (tight) crack with no spalling or faulting, or a well-sealed crack with no visible faulting or spalling.	LF		
***{Severity L}			
b. A crack with a width between 3/8 and 3/4 inch; and with a medium or low severity spalling and/or faulting less than 1/2 inch.	LF		
***{Severity M}			
c. A crack with width greater than 1 inch; a crack with a high-severity level of spalling; or a crack faulted 1/2 inch or more.	LF		2
***{Severity H}			
Defect:			
*** Longitudinal Joint Faulting:**			
Observation:			
Difference in elevation:			
a. 1/8 to 3/8 inch	EA		
***{Severity L}			
b. 3/8 to 3/4 inch	EA		
***{Severity M}			
c. Greater than 3/4 inch	EA		
***{Severity H}			
Defect:			
*** Scaling:**			
Observation:			
a. Scaling is noticeable	SF		
***{Severity L}			
b. Peeling away of surface mortar flakes over coarse aggregate, less than 50 cavities per 9 SF	SF		
***{Severity M}			
c. Disintegration of surface mortar	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration** The size of patches within each sample unit are recorded. The SF of patches at different severity levels are recorded separately. Patch is rated low severity even if it is in excellent condition.			
Observation:			
a. Patch has little or no deterioration. Some low severity spalling of the patch edges may exist.	SF		
***{Severity L}			
b. Faulting across the slab-patch joints must be less than ¼ inch.	SF		
***{Severity L}			
c. Patch has cracked (low-severity level) and/or some spalling of medium-severity level exists around the edges.	SF		
***{Severity M}			
d. Minor rutting may be present. Faulting of ¼ to ¾ inch exists. Temporary patches may have been placed because of permanent patch deterioration.	SF		
***{Severity M}			
e. Patch has deteriorated by spalling, rutting or cracking within the patch to a condition which requires replacement.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Popouts:** The density of popouts can be determined by counting the number of popouts per 9 SF of slab surface. The average popout density must exceed approximately one popout per 9 SF over the entire slab area before they are counted as a distress.			
Average popout density over the entire slab: Observation:			
a. 1 to 5 popouts per 9 SF.	EA		
***{Severity L}			
b. 6-10 popouts per 9 SF.	EA		
***{Severity M}			
c. Greater than 10 popouts per 9 SF.	EA		
***{Severity H}			
Defect:			
*** Pumping and Water Bleeding:**			
Observation:			
a. Water is forced out of a joint or crack when vehicles pass over the joints or cracks; water is forced out of the lane/shoulder longitudinal joint when vehicles pass along the joint; or water bleeding exists. No fines can be seen on the surface of the traffic lanes or shoulder.	LF		
***{Severity L}			
b. A small amount of pumped material can be observed near some of the joints or cracks on the surface of the traffic lane or shoulder.	LF		
***{Severity M}			
c. A significant amount of pumped materials exist on the pavement surface of the traffic lane or shoulder along the joints or cracks.	LF		2
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Map Cracking or Crazing:**			
Observation:			
a. Crazing or map cracking exists but is barely noticeable; the surface is in good condition with no scaling.	SF		
***{Severity L}	SF		
b. Crazing or map cracking noticeable over the whole area; scaling exists.			
***{Severity M}			
c. Well pronounced crazing or map cracking over the whole area; scaling exists.	SF		
***{Severity H}			
Defect:			
*** Spalling (Transverse Joint/Crack):** Spalling is measured by counting and recording separately the number of joints with each severity level. If more than one level of severity exists along a joint, all will be recorded as highest severity level present. Spalling of cracks should not be recorded except when the spalling is caused by "D" cracking. The spalling of cracks is included in rating severity levels of cracks.			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing, but the spalled area does not present a vehicular hazard. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}	EA		
c. The joint is severely spalled to the extent that a vehicular hazard exists.			
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Spalling (Longitudinal Joint/Crack):** Spalling is measured by counting and recording separately the number of joints with each severity level. If more than one level of severity exists along a joint, all will be recorded as the highest severity level present. Spalling of cracks should not be recorded except when spalling is caused by "D" cracking. The spalling of cracks is included in rating severity levels of cracks.			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing, but the spalled area does not present a vehicular hazard. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}			
c. The joint is severely spalled to the extent that a vehicular hazard exists.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Spalling (corner):**			
Observation:			
a. The spall is not broken into pieces and is in place and not loose.	EA		
***{Severity L}			
b. One of the following conditions exists: Spall is broken into pieces; cracks are spalled; some or all pieces are loose or missing but do not present potential vehicular damage; or spall is patched.	EA		
***{Severity M}			
c. Pieces of spall are missing to the extent that the hole may cause vehicular damage.	EA		
***{Severity H}			
Defect:			
*** Swelling:** Severity levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Swell causes a distinct bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Swell causes significant bounce of the vehicle which creates some discomfort.	EA		
***{Severity M}			
c. Swell causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Transverse and Diagonal Cracks:** If the crack does not have the same severity level along the entire length, the crack is rated at the highest severity present.			
Observation:			
a. Hairline (tight) crack with no spalling or faulting, a well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. A crack with a width of between 3/8 - 3/4 inch; and a low- to medium-severity level of spalling.	EA		
***{Severity M}			
c. Faulting less than ½ inch. Temporary patching may be present.	EA		
***{Severity M}			
d. A crack with width of greater than 1 inch.	EA		2
***{Severity H}			
e. A crack with a high-severity level of spalling; or a crack faulted ½ inch or more.	EA		2
***{Severity H}			

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Polished Aggregate:** The existence of polishing can be detected by both visually observing and running the fingers over the surface.			
Observation:			
a. Aggregate extending above the pavement is negligible, and the surface aggregate is smooth to the touch.	SF		
***{Severity L			
b. Pavement surface is smooth and has a distinctive dull finish.	SF		
***{Severity M}			
c. Pavement surface appears highly smooth and the aggregate are highly polished.	SF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.06 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Punchout:** If a slab contains one or more punchouts, it is counted as containing a punchout at the severity level of the most severe punchout.			
Observation:			
a. Slab contains two to five punchouts with some or all cracks of low-severity.	EA		
***{Severity L}			
b. Slab contains two to five punchouts with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab contains five or more punchouts with all cracks of low-severity.	EA		
***{Severity M}			
d. Slabs contain two or three punchouts with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slabs contain four or five punchouts with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab contain five or more punchouts with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			
Defect:			
*** Shrinkage Cracking:**			
Observation:			
a. Shrinkage cracks are visible with no raveling.	EA		
***{Severity L}			
b. Shrinkage cracks are clearly visible with some raveling evident.	EA		
***{Severity M}			
c. Shrinkage cracks have raveled or spalled.	EA		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ 19.02.07 CURB AND GUTTER

Curb and gutter is a barrier constructed at the pavement edge to channel water runoff from pavement to the drainage system. Besides controlling drainage the curbs and gutters are also used to deter vehicles from leaving the roadway. Curbs and gutters may be either precast, cast-in-place concrete, formed of asphaltic concrete, stone, or masonry.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
* **Cracks:**			
Observation:			
a. Transverse cracks less than 1/2 inch wide; and longitudinal cracks on gutters less than 1/4 inch wide.	LF		
***{Severity L}			
b. Transverse cracks between 1/2-3/4 inch wide; and longitudinal cracks on gutters between 1/4-1/2 inch wide.	LF		
***{Severity M}			
c. Transverse cracks more than 3/4 inch wide; and longitudinal cracks on gutters more than 1/2 inch wide.	LF		
***{Severity H}			
Defect:			
* **Tilting:**			
Observation:			
a. Unit has started to tilt away from the roadway, less than 1 inch movement.	LF		
***{Severity L}			
b. Earth support at the curb end has eroded and the unit has tilted by 1 inch ore more.	LF		
***{Severity M}			
c. Unit has tilted in excess of 6 inches.	LF		
***{Severity H}			

19.02 PARKING LOTS

COMPONENTS (Continued)

◆ **19.02.07 CURB AND GUTTER (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
* **Spalling:**			
Observation:			
a. Depressions greater than 1 inch deep and greater than 6 inches in diameter or spall does not extend more than 3 inches on either side of crack.	EA		
***{Severity L}			
b. Depressions greater than 1 inch deep and greater than 6 inches in diameter with corroded re-bars.	EA		
***{Severity M}			
c. Spalls extend more than 3 inches on either side of cracks. Some pieces may be loose.	EA		
***{Severity M}			
d. Depressions, joints, and cracks have severely spalled.	EA		
***{Severity H}			

19.02 PARKING LOTS

REFERENCES

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

7. TM 5-626, Unsurfaced Road Maintenance Management, (being revised).

19.02 PARKING LOTS

LEVEL II KEY	GUIDE SHEET CONTROL NUMBER
N/A	

LEVEL III KEY	GUIDE SHEET CONTROL NUMBER
1	GS-III 19.02.04-1
2	GS-III 19.02.06-2

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.02.04-1

Application

This guide applies to investigation and testing of asphaltic concrete parking lots to determine their structural capacity and remaining pavement life.

Special Safety Requirements

Passing traffic is a hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems of the base, its analyses, however, cannot determine structural capacity of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III is essential. Level III requires the use of Non-Destructive Testing (NDT) Techniques to measure pavement deflection, and partially destructive testing of one or more pavement components to determine component properties and strength. NDT equipment include:

- Benkleman Beam
- Dynaflect
- Falling Weight Deflectometer

NDT technique can be used to detect voids under the pavement by the use of Ground Penetrating Radar equipment and Infrared Thermography Method. Partially destructive techniques include sample coring through asphalt pavements to determine thickness, strength, and composition.

Special Tools & Equipment

Standard testing equipment required to perform the NDT and/or partially destructive testing.

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1 (Continued)

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.02.04-1

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Alligator or Fatigue Cracking.
- Bumps and Sags
- Corrugation
- Edge Cracking
- Longitudinal and Transverse Cracking
- Pumping and Water Bleeding
- Rutting

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 2

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.02.06-2

Application

This guide applies to investigation and testing of portland concrete parking lots, hardstands, and walkways to determine their structural capacity and remaining pavement life.

Special Safety Requirements

Passing traffic is a hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems of the base, its analyses, however, cannot determine structural capacity of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of Non-Destructive Testing (NDT) Techniques to measure pavement deflection, and partially destructive testing of one or more pavement components to determine component properties and strength. NDT equipment include:

- Benkleman Beam
- Dynaflect
- Falling Weight Deflectometer

NDT technique can be used to detect voids under the pavement by the use of Ground Penetrating Radar equipment and Infrared Thermography Method. Partially destructive techniques include sample coring through concrete pavements to determine thickness, strength, and composition.

Special Tools and Equipment

Standard testing equipment required to perform the NDT and/or partially destructive testing.

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 2 (Continued)

COMPONENT: PORTLAND CEMENT CONCRETE PAVEMENT SLAB
CONTROL NUMBER: GS-III 19.02.06-2

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Depression
- Joint Load Transfer System Associated Deterioration
- Longitudinal Cracks
- Transverse and Diagonal Cracks
- Pumping and Water Bleeding

References

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

19.03 SIDEWALKS/WALKWAYS

DESCRIPTION

Sidewalks/Walkways are made up of paved areas consisting of asphalt and concrete surfacing. Asphalt or flexible pavement structure is a combination of granular subbase, aggregate base course, and asphaltic concrete courses placed on subgrade to support the imposed load and distribute it to the underlying roadbed soils. Concrete or rigid pavement, on the other hand, consists of Portland cement concrete slab built over an aggregate base course and placed on subgrade. Subgrade is either compacted surface of the natural ground or compacted surface of the embankment.

SPECIAL TOOL AND EQUIPMENT REQUIREMENTS

The following list of special tools and equipment, beyond the requirements listed in the Standard Tool Section, shall be developed as required to perform the inspection of Sidewalks/Walkways:

Lightweight Life Safety Vest
Scale: 12 inches long that reads to ⅛ inch
Straight Edge: 10 feet
Hand Odometer Wheel: To read 0.1 ft
Spray Paint: For marking

SPECIAL SAFETY REQUIREMENTS

The inspection must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access. Inspector will be required to wear international orange safety vests.

COMPONENT LIST

- 19.03.01 SUBGRADE
- 19.03.02 BASE COURSE
- 19.03.03 ASPHALTIC COURSE
- 19.03.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB

19.03 SIDEWALKS/WALKWAYS

RELATED SUBSYSTEMS

Due to the related nature of the elements requiring inspection, the following should be reviewed for concurrent inspection activities.

18.01	AIRFIELD PAVEMENT/DRAINAGE
23.03	STORM WATER COLLECTION SYSTEM

STANDARD INSPECTION PROCEDURE

The inspection shall be carried out for each type of walkway listed. The inspector will identify types of physical distresses existing in the pavement, and measure the quantity of each distress. The observation contains the description of each distress and guidelines to determine the level of severity.

COMPONENTS

◆ 19.03.01 SUBGRADE

Subgrade is the top surface of the natural ground or embankment upon which the walkway structure is constructed. Subgrade is always covered under various other layers of the walkway structure.

◆ 19.03.02 BASE COURSE

Base Course is the layer or layers of selected material of designed thickness placed on a subgrade to support the walkway surface. Base course material generally consists of high quality processed crushed aggregate. It is also used for various other purposes, such as control of frost action, and drainage.

Base course remains covered beneath the walkway surface.

19.03 SIDEWALKS/WALKWAYS

COMPONENTS (Continued)

◆ 19.03.03 ASPHALTIC COURSE

Asphaltic course is the surface course of a flexible pavement structure and consists of a mixture of mineral aggregates and bituminous materials placed in one or more layers to accommodate pedestrian and light vehicular traffic.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Cracking:**			
Observation:			
a. Non-sealed cracks have either minor spalling or no spalling; the cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Sealed cracks have either minor spalling or no spalling; cracks are of any width, but their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
d. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
e. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
f. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
g. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		
***{Severity H}			

19.03 SIDEWALKS/WALKWAYS

COMPONENTS (Continued)

◆ 19.03.04 PORTLAND CEMENT CONCRETE SLAB

The basic materials in the paved slab are portland cement concrete, reinforcing steel, load transfer devices, and joint sealing materials.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Shrinkage Cracking:**			
Observation:			
a. Shrinkage cracks are visible with no raveling.	EA		
***{Severity L}			
b. Shrinkage cracks are clearly visible with some raveling evident.	EA		
***{Severity M}			
c. Shrinkage cracks have raveled or spalled.	EA		
***{Severity H}			
Defect:			
*** Spalling:**			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}			
c. The joint is severely spalled.	EA		
***{Severity H}			

19.03 SIDEWALKS/WALKWAYS

COMPONENTS (Continued)

◆ 19.03.04 PORTLAND CEMENT CONCRETE SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Transverse and Diagonal Cracks:**			
Observation:			
a. Hairline (tight) crack with no spalling or faulting, a well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. A crack with a width of between 3/8 - 3/4 inch; and a low- to medium-severity level of spalling.	EA		
***{Severity M}			
c. Faulting less than ½ inch. Temporary patching may be present.	EA		
***{Severity M}			
d. A crack with width of greater than 1 inch.	EA		
***{Severity H}			
e. A crack with a high-severity level of spalling; or a crack faulted ½ inch or more.	EA		
***{Severity H}			

19.03 SIDEWALKS/WALKWAYS

REFERENCES

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

19.03 SIDEWALKS/WALKWAYS

LEVEL II KEY	GUIDE SHEET CONTROL NUMBER

N/A

LEVEL III KEY	GUIDE SHEET CONTROL NUMBER

N/A

19.04 OPEN STORAGE AND HARDSTANDS

DESCRIPTION

Open storage areas and hardstands are designed as pavements. Asphalt or flexible pavement structure is a combination of granular subbase, aggregate base course, and asphaltic concrete courses placed on subgrade to support the traffic load and distribute it to the underlying roadbed soils. Concrete or rigid pavement, on the other hand, consists of Portland cement concrete slab built over an aggregate base course and placed on subgrade. Subgrade is either compacted surface of the natural ground or compacted surface of the embankment.

Both rigid and flexible pavements transfer the load of moving vehicles to the underlying subgrade, but in a differing manner. The load is essentially carried by structural slab in case of the rigid pavement which distributes the load over a relatively wide area of subgrade. Therefore, structural strength of the concrete is the single most important factor in the design of the rigid pavement. The load over the flexible pavement is distributed through the asphaltic and granular layered system and essentially transferred to the subgrade. Hence, the strength of the flexible pavement lies in building up thick layers, with the highest quality materials at or near surface. Thickness of these layers is highly dependent on the strength of the subgrade.

SPECIAL TOOL AND EQUIPMENT REQUIREMENTS

The following list of special tools and equipment, beyond the requirements listed in the Standard Tool Section, shall be developed as required to perform the inspection of the open storage and hardstands:

Lightweight Life Safety Vest
Scale: 12 inches long that reads to ⅛ inch
Straight Edge: 10 feet
Hand Odometer Wheel: To read 0.1 ft
Spray Paint: For marking
Sedan Automobile

SPECIAL SAFETY REQUIREMENTS

Since the inspection is performed by walking over the pavement, passing traffic is a hazard. The inspection must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access in coordination with installation for required safety traffic signage. Inspector will be required to wear international orange safety vests.

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENT LIST

- 19.04.01 SUBGRADE
- 19.04.02 BASE COURSE
- 19.04.03 ASPHALTIC COURSE
- 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB
- 19.04.05 CURB AND GUTTER

RELATED SUBSYSTEMS

Due to the related nature of the elements requiring inspection, the following should be reviewed for concurrent inspection activities.

18.01	AIRFIELD PAVEMENT/DRAINAGE
23.03	STORM WATER COLLECTION SYSTEM

STANDARD INSPECTION PROCEDURE

The inspection shall be carried out for each pavement type listed. The inspector will identify types of physical distresses existing in the pavement, and measure the quantity of each distress. The observation contains the description of each distress and guidelines to determine the level of severity. For Level III inspection and testing items, refer to Level III Guide Sheets for inspection procedure.

COMPONENTS

◆ 19.04.01 SUBGRADE

Subgrade is the top surface of a roadbed or embankment upon which the pavement structures are constructed. Subgrade is always covered under various other components of pavement structure. See Level III Guide Sheets for inspection procedures.

◆ 19.04.02 BASE COURSE

Base Course is the layer or layers of selected material of designed thickness placed on a subbase or a subgrade to support the open storage area or hardstand surface. Base course material generally consists of high quality processed crushed aggregate. It is also used for various other purposes, such as control of frost action, and drainage. See Level III Guide Sheets for inspection procedures.

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.03 ASPHALTIC COURSE

Asphaltic course is the surface course of a flexible pavement structure and consists of a mixture of mineral aggregates and bituminous materials placed in one or more layers to accommodate the traffic load. The top asphaltic layer of flexible pavement is called "wearing course", and in addition to its major function as a structural portion of the pavement, it is designed to resists skidding, traffic abrasion, and the disintegrating effects of climate.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Asphalt Bleeding:**			
Observation: a. Bleeding has only occurred to a very slight degree and it is noticeable only during a few days a year. Asphalt does not stick to shoes or vehicles. ***{Severity L}	SF		
b. Bleeding has occurred to the extent that asphalt sticks to shoes and vehicles during only a few weeks of the year. ***{Severity M}	SF		
c. Bleeding has occurred extensively and considerable asphalt sticks to shoes and vehicles during at least several weeks of the year. ***{Severity H}	SF		

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Block Cracking**			
Observation:			
a. Blocks are defined by non-sealed cracks that are non-spalled (sides of the crack are vertical) or only minor spalling with a ¼-inch or less mean width.	SF		
***{Severity L}			
b. Blocks are defined by sealed cracks that have a sealant in satisfactory condition to prevent moisture infiltration.	SF		
***{Severity L}			
c. Blocks are defined by sealed or non-sealed cracks that are moderately spalled.	SF		
***{Severity M}			
d. Blocks are defined by non-sealed cracks that are not spalled or have only minor spalling, but have a mean width greater than approximately 1/4-inch.	SF		
***{Severity M}			
e. Blocks are defined by sealed cracks that are not spalled or have only minor spalling, but have sealant in unsatisfactory condition to prevent moisture infiltration.	SF		
***{Severity M}			
f. Blocks are well defined by cracks that are severely spalled.	SF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corrugation:** Severity levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Corrugations cause some vibration of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Corrugations cause significant vibration of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Corrugations cause excessive vibration of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	SF		1
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.03 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal and Transverse Cracking:** The vehicle used to determine bump severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Non-sealed cracks have either minor spalling or no spalling; the cracks have a mean width of ¼-inch or less.	LF		
***{Severity L}			
b. Sealed cracks have either minor spalling or no spalling; cracks are of any width, but their sealant material is in satisfactory condition to substantially prevent water infiltration.	LF		
***{Severity L}			
c. No significant bump occurs when a vehicle crosses the crack.	LF		
***{Severity L}			
d. Cracks are moderately spalled and can be either sealed or non-sealed of any width.	LF		
***{Severity M}			
e. Sealed cracks are not spalled or have only minor spalling, but the sealant is in a condition so that water can freely infiltrate.	LF		
***{Severity M}			
f. Non-sealed cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼-inch.	LF		
***{Severity M}			
g. Low-severity random cracking exists near the crack or at the corners of intersecting cracks.	LF		
***{Severity M}			
h. The crack causes a significant bump to a vehicle.	LF		
***{Severity M}			
i. Cracks are severely spalled and/or there exists medium or high severity random cracking near the crack or at the corners of intersecting cracks.	LF		1
***{Severity H}			
j. The crack causes a severe bump to a vehicle.	LF		1
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.03 ASPHALTIC COURSE (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration:** The vehicle used to determine patch condition severity is a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Patch is in very good condition and is performing satisfactorily.	SF		
***{Severity L}			
b. Patch is somewhat deteriorated, having low to medium levels of any types of distress.	SF		
***{Severity M}			
c. The patch causes a significant bump to a vehicle.	SF		
***{Severity M}			
d. Patch is badly deteriorated and soon needs replacement.	SF		
***{Severity H}			
e. The patch causes a severe bump to a vehicle.	SF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Potholes:**			
Observation:			
a. Pothole area up to 3 SF and depth less than 1 inch.	EA		
***{Severity L}			
b. Pothole area up to 3 SF and depth between 1 and 2 inches.	EA		
***{Severity M}			
c. Pothole area more than 3 SF and depth less than 1 inch.	EA		
***{Severity M}			
d. Pothole area less than 1 SF and depth more than 2 inches.	EA		
***{Severity M}			
e. Pothole area between 1 and 3 SF and depth more than 2 inches.	EA		
***{Severity H}			
f. Pothole area more than 3 SF and depth more than 1 inch.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Pumping and Water Bleeding:**			
Observation:			
a. Water bleeding exists or water pumping can be observed when heavy loads pass over the pavement; however, no fines (or only a very small amount) can be seen on the surface of the pavement.	SF		
***{Severity L}			
b. Some pumped material can be observed near cracks in the pavement surface.	SF		
***{Severity M}			
c. A significant amount of pumped material exists on the pavement surface near the cracks.	SF		1
***{Severity H}			
Defect:			
*** Ravelling and Weathering:**			
Observation:			
a. Aggregate or binder has started to wear away but has not progressed significantly.	SF		
***{Severity L}			
b. Aggregate and/or binder has worn away and the surface texture is moderately rough and pitted. Loose particles generally exist.	SF		
***{Severity M}			
c. Aggregate and/or binder has worn away and the surface texture is severely rough and pitted.	SF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Swelling:** Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Swells cause some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Swells cause significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Swells cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			
Defect:			
*** Bumps and Sags:** If the bump occurs in combination with a crack, the crack is also recorded. Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Bumps and sags cause some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Bumps and sags cause significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Bumps and sags cause excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		1
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.03 ASPHALTIC COURSE (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Shoving:** Severity level is determined by riding in a mid- to full-size sedan weighing approximately 3,000 to 3,800 lb. over the pavement inspection unit at the posted speed limit.			
Observation:			
a. Shove causes some bounce of the vehicle which creates no discomfort.	SF		
***{Severity L}			
b. Shove causes significant bounce of the vehicle which creates some discomfort.	SF		
***{Severity M}			
c. Shove causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazards, and/or vehicle damage, requiring a reduction in speed for safety.	SF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB

The basic materials in the pavement slab are portland cement concrete, reinforcing steel, load transfer devices, and joint sealing materials.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Blow-up:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Blow-up has occurred, but only causes some bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Blow-up causes a significant bounce of the vehicle which creates some discomfort. Temporary patching may have been placed because of the blow-up.	EA		
***{Severity M}			
c. Blow-up causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Corner Break:**			
Observation:			
a. Crack is tight (hairline). Well-sealed cracks are considered tight. No faulting or breakup of broken corner exists. Crack is not spalled.	EA		
***{Severity L}			
b. Crack is working and spalled at medium severity, but break-up of broken corner has not occurred. Faulting of crack or joint is less than ½ inch. Temporary patching may have been placed because of corner break.	EA		
***{Severity M}			
c. Crack is spalled at high severity, the corner piece has broken into two or more pieces, or faulting of crack or joint is more than ½ inch.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Depression:** Severity level is determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Depression causes a distinct bounce of the vehicle which creates no discomfort. ***{Severity L}	EA		
b. Depression causes a significant bounce of the vehicle which creates some discomfort. ***{Severity M}	EA		
c. Depression causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety. ***{Severity H}	EA		

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Durability Cracking:** Different severity levels are counted and recorded separately. "D" cracking should not be counted if the fine crack pattern has not developed near cracks, joints and free edges. Popouts and discoloration of joints, cracks and free edges may occur without "D" cracking.			
Observation:			
a. The characteristic pattern of closely spaced fine cracks has developed near joints, cracks, and/or free edges; however, the width of the affected area is generally less than 12 inches wide at the center of the lane in transverse cracks and joints. The crack pattern may fan out at the intersection of transverse cracks/joints with longitudinal cracks/joints. No joint/crack spalling has occurred, and no patches have been placed for "D" cracking.	EA		
***{Severity L}			
b. The characteristic pattern of closely spaced cracks has developed near the crack, joint or free edge and is generally wider than 12 inches at the center of the lane in transverse cracks and/or joints.	EA		
***{Severity M}			
c. Low-or medium-severity joint/crack or corner spalling has developed in the affected area.	EA		
***{Severity M}			
d. Temporary patches have been placed due to "D" cracking-induced spalling.	EA		
***{Severity M}			
e. The pattern of fine cracks has developed near joints or cracks and a high severity level of spalling at joints/cracks exists and considerable material is loose in the affected area.	EA		
***{Severity H}			
f. The crack pattern has developed generally over the entire slab area between cracks and/or joints.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Faulting of Transverse Joints and Cracks:** Faulting is determined by measuring the difference in elevation of slabs at transverse joints for the slabs in the sample unit. Faulting of cracks is measured as a guide to determine the distress level of the crack. Faulting is measured 1 foot in from the outside (right) slab on all lanes except the innermost passing lane. Faulting is measured 1 foot in from the inside (left) slab edge on the inner passing lane. If temporary patching prevents measurement, proceed on to the next joint. Faulting is always positive and is measured in the direction of traffic flow.			
Observation: Difference in elevation per each slab:			
a. Less than ⅜ inch ***{Severity L}	EA		
b. ⅜ to ¾ inch ***{Severity M}	EA		
c. Greater than ¾ inch ***{Severity H}	EA		

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Joint Seal Damage of Transverse Joints:**			
Observation:			
a. Joint sealant is in good condition throughout the section with only a minor amount of any of the six types of damage present (as described in Appendix B). Little water and no incompressible materials can infiltrate through the joint.	EA		
***{Severity L}			
b. Joint sealant is in fair condition over the entire surveyed section, with one or more of the six types of damage (as described in Appendix B) occurring to a moderate degree. Water can infiltrate the joint fairly easily; some incompressible materials can infiltrate the joint.	EA		
***{Severity M}			
c. Sealant needs replacement within 1 to 3 years.	EA		
***{Severity M}			
d. Joint sealant is in poor condition over most of the sample unit, with one or more of the six types of damage (as described in Appendix B) occurring to a severe degree. Water and incompressible materials can freely infiltrate the joint.	EA		
***{Severity H}			
e. Sealant needs immediate replacement.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Longitudinal Cracks:**			
Observation:			
a. Hairline (tight) crack with no spalling or faulting, or a well-sealed crack with no visible faulting or spalling.	LF		
***{Severity L}			
b. A crack with a width between 3/8 and 3/4 inch; and with a medium or low severity spalling and/or faulting less than 1/2 inch.	LF		
***{Severity M}			
c. A crack with width greater than 1 inch; a crack with a high-severity level of spalling; or a crack faulted 1/2 inch or more.	LF		
***{Severity H}			

Defect:

*** Longitudinal Joint Faulting:**

Observation:
Difference in elevation:

a. 1/8 to 3/8 inch	EA		
***{Severity L}			
b. 3/8 to 3/4 inch	EA		
***{Severity M}			
c. Greater than 3/4 inch	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Patch Deterioration** The size of patches within each sample unit are recorded. The SF of patches at different severity levels are recorded separately. Patch is rated low severity even if it is in excellent condition.			
Observation:			
a. Patch has little or no deterioration. Some low severity spalling of the patch edges may exist.	SF		
***{Severity L}			
b. Faulting across the slab-patch joints must be less than ¼ inch.	SF		
***{Severity L}			
c. Patch has cracked (low-severity level) and/or some spalling of medium-severity level exists around the edges.	SF		
***{Severity M}			
d. Minor rutting may be present. Faulting of ¼ to ¾ inch exists. Temporary patches may have been placed because of permanent patch deterioration.	SF		
***{Severity M}			
e. Patch has deteriorated by spalling, rutting or cracking within the patch to a condition which requires replacement.	SF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Popouts:** The density of popouts can be determined by counting the number of popouts per 9 SF of slab surface. The average popout density must exceed approximately one popout per 9 SF over the entire slab area before they are counted as a distress.			
Average popout density over the entire slab: Observation:			
a. 1 to 5 popouts per 9 SF.	EA		
***{Severity L}			
b. 6-10 popouts per 9 SF.	EA		
***{Severity M}			
c. Greater than 10 popouts per 9 SF.	EA		
***{Severity H}			

Defect:

*** Pumping and Water Bleeding:**

Observation:

a. Water is forced out of a joint or crack when vehicles pass over the joints or cracks; water is forced out of the lane/shoulder longitudinal joint when vehicles pass along the joint; or water bleeding exists. No fines can be seen on the surface of the traffic lanes or shoulder. LF

***{Severity L}

b. A small amount of pumped material can be observed near some of the joints or cracks on the surface of the traffic lane or shoulder. LF

***{Severity M}

c. A significant amount of pumped materials exist on the pavement surface of the traffic lane or shoulder along the joints or cracks. LF

***{Severity H}

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Map Cracking or Crazing:**			
Observation:			
a. Crazing or map cracking exists but is barely noticeable; the surface is in good condition with no scaling.	SF		
***{Severity L}	SF		
b. Crazing or map cracking noticeable over the whole area; scaling exists.			
***{Severity M}			
c. Well pronounced crazing or map cracking over the whole area; scaling exists.	SF		
***{Severity H}			
Defect:			
*** Spalling:**			
Observation:			
a. The spall does not extend more than 3 inches on either side of the joint or crack. No temporary patching has been placed to repair the spall.	EA		
***{Severity L}			
b. The spall extends more than 3 inches on either side of the joint or crack. Some pieces may be loose and/or missing, but the spalled area does not present a vehicular hazard. Temporary patching may have been placed because of spalling.	EA		
***{Severity M}	EA		
c. The joint is severely spalled to the extent that a vehicular hazard exists.			
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Swelling:** Severity levels are determined by riding in a mid- to full-sized sedan weighing approximately 3,000 to 3,800 lb. over the uniform section at the posted speed limit.			
Observation:			
a. Swell causes a distinct bounce of the vehicle which creates no discomfort.	EA		
***{Severity L}			
b. Swell causes significant bounce of the vehicle which creates some discomfort.	EA		
***{Severity M}			
c. Swell causes excessive bounce of the vehicle which creates substantial discomfort, and/or a safety hazard, and/or vehicle damage, requiring a reduction in speed for safety.	EA		
***{Severity H}			

Defect:

*** Transverse and Diagonal Cracks:**
If the crack does not have the same severity level along the entire length, the crack is rated at the highest severity present.

Observation:			
a. Hairline (tight) crack with no spalling or faulting, a well-sealed crack with no visible faulting or spalling.	EA		
***{Severity L}			
b. A crack with a width of between 3/8 - 3/4 inch; and a low- to medium-severity level of spalling.	EA		
***{Severity M}			
c. Faulting less than ½ inch. Temporary patching may be present.	EA		
***{Severity M}			
d. A crack with width of greater than 1 inch.	EA		
***{Severity H}			
e. A crack with a high-severity level of spalling; or a crack faulted ½ inch or more.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:

*** Divided Slab/Shattered Slab:** If the slab is measured to have medium- or high-severity deficiency, no other distress is counted.	**UOM**	**LEVEL II KEY**	**LEVEL III KEY**
Observation:			
a. Slab is broken into four to eight pieces with all cracks of low-severity.	EA		
***{Severity L}			
b. Slab is broken into four to eight pieces with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab is broken into more than eight pieces with all cracks of low-severity.	EA		
***{Severity M}			
d. Slab is broken into four or five pieces with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slab is broken into six to eight pieces with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab is broken into more than eight pieces with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			

Defect:

*** Polished Aggregate:** The existence of polishing can be detected by both visually observing and running the fingers over the surface.	
Observation:	
a. Aggregate extending above the pavement is negligible, and the surface aggregate is smooth to the touch.	SF
***{Severity L	
b. Pavement surface is smooth and has a distinctive dull finish.	SF
***{Severity M}	
c. Pavement surface appears highly smooth and the aggregate are highly polished.	SF
***{Severity H}	

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.04 PORTLAND CEMENT CONCRETE PAVEMENT SLAB (Continued)

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
*** Punchout:** If a slab contains one or more punchouts, it is counted as containing a punchout at the severity level of the most severe punchout.			
Observation:			
a. Slab contains two to five punchouts with some or all cracks of low-severity.	EA		
***{Severity L}			
b. Slab contains two to five punchouts with some or all cracks of medium-severity.	EA		
***{Severity M}			
c. Slab contains five or more punchouts with all cracks of low-severity.	EA		
***{Severity M}			
d. Slabs contain two or three punchouts with some or all cracks of high-severity.	EA		
***{Severity M}			
e. Slabs contain four or five punchouts with some or all cracks of high-severity.	EA		
***{Severity H}			
f. Slab contain five or more punchouts with some or all cracks of medium- or high-severity.	EA		
***{Severity H}			
Defect:			
*** Shrinkage Cracking:**			
Observation:			
a. Shrinkage cracks are visible with no raveling.	EA		
***{Severity L}			
b. Shrinkage cracks are clearly visible with some raveling evident.	EA		
***{Severity M}			
c. Shrinkage cracks have raveled or spalled.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ 19.04.05 CURB AND GUTTER

Curb and gutter is a barrier constructed at the pavement edge to channel water runoff from pavement to the drainage system. Besides controlling drainage the curbs and gutters are also used to deter vehicles from leaving the roadway. Curbs and gutters may be either precast, cast-in-place concrete, formed of asphaltic concrete, stone, or masonry.

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
* **Cracks:**			
Observation:			
a. Transverse cracks less than 1/2 inch wide; and longitudinal cracks on gutters less than 1/4 inch wide.	LF		
***{Severity L}			
b. Transverse cracks between 1/2-3/4 inch wide; and longitudinal cracks on gutters between 1/4-1/2 inch wide.	LF		
***{Severity M}			
c. Transverse cracks more than 3/4 inch wide; and longitudinal cracks on gutters more than 1/2 inch wide.	LF		
***{Severity H}			
Defect:			
* **Tilting:**			
Observation:			
a. Unit has started to tilt away from the roadway, less than 1 inch movement.	LF		
***{Severity L}			
b. Earth support at the curb end has eroded and the unit has tilted by 1 inch ore more.	LF		
***{Severity M}			
c. Unit has tilted in excess of 6 inches.	LF		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

COMPONENTS (Continued)

◆ **19.04.05 CURB AND GUTTER (Continued)**

Defect:	UOM	LEVEL II KEY	LEVEL III KEY
* **Spalling:**			
Observation:			
a. Depressions greater than 1 inch deep and greater than 6 inches in diameter or spall does not extend more than 3 inches on either side of crack.	EA		
***{Severity L}			
b. Depressions greater than 1 inch deep and greater than 6 inches in diameter with corroded re-bars.	EA		
***{Severity M}			
c. Spalls extend more than 3 inches on either side of cracks. Some pieces may be loose.	EA		
***{Severity M}			
d. Depressions, joints, and cracks have severely spalled.	EA		
***{Severity H}			

19.04 OPEN STORAGE AND HARDSTANDS

REFERENCES

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

19.04 OPEN STORAGE AND HARDSTANDS

LEVEL II KEY	GUIDE SHEET CONTROL NUMBER
N/A	

LEVEL III KEY	GUIDE SHEET CONTROL NUMBER
1	GS-III 19.04.03-1

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.04.03-1

Application

This guide applies to investigation and testing of asphaltic concrete open storage areas and hardstands to determine their structural capacity.

Special Safety Requirements

Passing traffic is a hazard. Level III inspection and testing must be performed with the prior approval of the Facility Manager who will notify the authorities to provide safety measures and safe access.

Inspection Actions

Results of Level I inspection yield a measure of surface integrity of the pavement surfaces. Although Level I inspection methodology is very useful for maintaining the pavement systems of the base, its analyses, however, cannot determine structural capacity of the pavement. When the pavement condition dictates that its rehabilitation may be required, then a more extensive Level III Inspection is essential. Level III requires the use of Non-Destructive Testing (NDT) Techniques to measure pavement deflection, and partially destructive testing of one or more pavement components to determine component properties and strength. NDT equipment include:

- Benkleman Beam
- Dynaflect
- Falling Weight Deflectometer

NDT technique can be used to detect voids under the pavement by the use of Ground Penetrating Radar equipment and Infrared Thermography Method. Partially destructive techniques include sample coring through asphalt pavements to determine thickness, strength, and composition.

Special Tools and Equipment

Standard testing equipment required to perform the NDT and/or partially destructive testing.

LEVEL III INSPECTION METHOD GUIDE SHEET

LEVEL III GUIDE SHEET - KEY NO. 1 (Continued)

COMPONENT: ASPHALTIC COURSE
CONTROL NUMBER: GS-III 19.04.03-1

Recommended Inspection Frequency

Level III inspection will only be performed when either of the following defects are identified by the Level I inspection requiring the need of such inspection:

- Bumps and Sags
- Corrugation
- Longitudinal and Transverse Cracking
- Pumping and Water Bleeding

References

1. AASHTO Guide for Design of Pavement Structures, 1986

2. TM 5-623, Pavement Maintenance Management, November 1982

3. Principals of Pavement Design, E. J. Yoder, John Wiley & Sons, Inc.

4. Micro PAVER, User's Guide, Version 3.0, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, January 1992

5. ASTM D 5340 - 93, Standard Test Method for Airport Pavement Condition Index Surveys

6. TM 5-826-6/ AFR 93-5, Procedures for US Army and US Air Force Airfield Condition Surveys, July 1989

APPENDIX A

ABBREVIATIONS

AGGR OR AGGRED	Aggregate
BLKS	Blocks
BLEEDNG	Bleeding
CORNRS	corners
CRKS	cracks
D	durability
DIA	diameter
DISCOMFRT	discomfort
EA	Each
EL	elevation
EXCESSV	excessive
GS-II	Guide Sheet, Level II Inspection Method
GS-III	Guide Sheet, Level III Inspection Method
HS	high severity
HZRD	hazard
IN	Inches
INFILTRAT	infiltration
INTRSE	intersecting
LF	Linear Feet
LO	low
LONGIT	longitudinal
LS	Low Severity
MAX	maximum

APPENDIX A

MED	medium
MOD	moderately
MOISTUR	Moisture
MS	Medium Severity
PCS	Pieces
REQ'D	required
SEVRL	Several
SF	Square Feet
SFTY	Safety
SUBSTNTIAL	Substantial
TEMP	Temporary
THRU	Through
TRAFF	Traffic
TRANSV	Transverse
TRAVLD	Traveled
UNSATISF	Unsatisfactory
UOM	Unit of Measure
VEHC OR VHC	Vehicle
W/	with
WKS	Weeks
YR	Year
&	and
"	inches
'	foot or feet

APPENDIX A

<	Less Than
>	Greater Than
= <	Equal to or Less Than
= >	Equal to or Greater Than

APPENDIX B

GLOSSARY

Alligator or Fatigue Cracking

Series of interconnecting cracks caused by fatigue failure of the asphalt concrete surface under repeated traffic loading. The cracking initiates at the bottom of the asphalt surface where tensile stress and strain is highest under a wheel load. The cracks propagate to the surface initially as one or more longitudinal parallel cracks. After repeated traffic loading, the cracks connect, forming many-sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are usually less than one foot on the longest side. Alligator cracking occurs only in areas that are subjected to repeated traffic loadings. Therefore, it would not occur over an entire area unless the entire area was subjected to traffic loading. Alligator cracking does not occur in asphalt overlays over concrete slabs. Alligator cracking is considered a major structural distress.

Asphalt Bleeding

A film of bituminous material on the pavement surface which creates a shiny, glass-like, reflecting surface that usually becomes quite sticky. Bleeding is caused by excessive amounts of asphalt cement in the mix and/or low air void contents. It occurs when asphalt fills the voids of the mix during hot weather and then expands out onto the surface of the pavement. Since the bleeding process is not reversible during cold weather, asphalt will accumulate on the surface.

Block Cracking

Cracks divide the asphalt surface into approximately rectangular pieces. The blocks range is size from approximately 1 ft^2 to 100 ft^2. Cracking into larger blocks are generally rated as longitudinal and transverse cracking. Block cracking is caused mainly by shrinkage of the asphalt concrete and daily temperature cycling (which results in daily stress/strain cycling). It is not load-associated, although load can increase the severity of individual cracks from low to medium to high. The occurrence of block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large proportion of pavement area, but sometimes will occur only in non-traffic areas.

Blow-up

Most blow-ups occur during the spring and hot summer at a transverse joint or wide crack. Infiltration of incompressible materials into the joint or crack during cold periods results in high compressive stresses in hot periods. When this compressive pressure becomes too great, a localized upward movement of the slab or shattering occurs at the joint or crack. Blow-ups are accelerated due to a spalling away of the slab at the bottom creating reduced joint contact area. The presence of "D" cracking or freeze-thaw damage also weakens the concrete near the joint resulting in increased spalling and blow-up potential.

APPENDIX B

Bumps and Sags

Bumps are small, localized, upward displacements of the pavement surface. they are different from shoves in that shoves are caused by unstable pavement. Bumps, on the other hand, can be caused by several factors, including:

1. Buckling or bulging of the surface of an asphalt concrete (AC) overlay over PCC pavement as a result of a blow-up in the PCC slab.
2. Infiltration and buildup of material in a crack in combination with traffic loading (sometimes called tenting).

Sags are small, abrupt, downward displacements of the pavement surface. If bumps appear in a pattern perpendicular to traffic flow and are spaced at less than 10 feet, the distress is called corrugation.

Corner Break

A crack that intersects the joints at a distance less than 6 feet on each side measured from the corner of the slab. A corner break extends vertically through the entire slab thickness. It should not be confused with a corner spall, which intersects the joint at an angle through the slab and is typically within 1 foot from the slab corner. Heavy repeated loads combined with pumping, poor load transfer across the joint, and thermal curling and moisture warping stresses result in corner breaks.

Corrugation

A form of plastic movement typified by ripples across the asphalt pavement surface. It occurs usually at points where traffic starts and stops. Corrugation usually occurs in asphalt layers that lack stability in warm weather, but may also be attributed to excessive moisture in a subgrade, contamination of the mix, or lack of aeration of liquid asphalt mixes.

On gravel-surfaced roads corrugations are closely spaced ridges and valleys (ripples) at fairly regular intervals. The ridges are perpendicular to the traffic direction. This type of distress is usually caused by traffic and loose aggregate. These ridges usually form on hills, on curves, in areas of acceleration of deceleration, or in areas where the road is soft or potholed.

Depression

This distress occurs only on pavements having an asphalt concrete surface over a jointed portland cement concrete (PCC) slab and they occur at transverse and longitudinal joints (i.e., widening joints). This distress does not include reflection cracking away from a joint or from any other type of base (i.e., cement stabilized, lime stabilized) as these cracks are identified as "Longitudinal and Transverse Cracking."

APPENDIX B

	In concrete pavements, depressions are localized settled areas. There is generally significant slab cracking in these areas due to uneven settlement. The depressions can be located by stains caused by oil droppings from vehicles and by riding over the pavement. Depressions can be caused by settlement or consolidation of the foundation soil or can be "built-in" during construction. They are frequently found near culverts. This is usually caused by poor compaction of soil around the culvert during construction. Depressions cause slab cracking, roughness and hydroplaning when filled with water of sufficient depth.
Divided Slab/ Shattered Slab	Slab is divided by cracks into four or more pieces due to overloading and/or inadequate support. If all pieces or cracks are contained within a corner break, the distress is categorized as a severe corner break.
Durability Cracking	Also known as "D" cracking, is a series of closely spaced crescent-shaped hairline cracks that appear at a PCC pavement slab surface adjacent and roughly parallel to transverse and longitudinal joints, transverse and longitudinal cracks, and the free edges of pavement slab. The fine surface cracks often curve around the intersection of longitudinal joints/cracks and transverse joints/cracks. These surface cracks often contain calcium hydroxide residue which causes a dark coloring of the crack and immediate surrounding area. This may eventually lead to disintegration of the concrete within 1 to 2 feet or more of the joint or crack, particularly in the wheelpaths. "D" cracking is caused by freeze-thaw expansive pressures of certain types of coarse aggregates and typically begins at the bottom of the slab which disintegrates first.
Dust	The wear and tear of traffic on unsurfaced roads will eventually loosen the larger particles from the soil binder. As traffic passes, dust clouds create a danger to trailing or passing vehicles and cause significant environmental problems.
Edge Cracking	Cracks parallel to and usually within one to two feet of the outer edge of the pavement. This distress is accelerated by traffic loading and can be caused by frost-weakened base or subgrade near the edge of the pavement. The area between the crack and pavement edge is classified as raveled if it breaks up (sometimes to the extent that pieces are removed).
Faulting of Transverse Joints and Cracks	A difference of elevation across a joint or crack. Faulting is caused in part by a buildup of loose materials under the approach slab near the joint or crack as well as depression of the leave slab. The buildup of eroded or infiltrated materials is caused by pumping from under the leave slab and shoulder (free moisture under pressure) due

APPENDIX B

to heavy loadings. The warp and/or curl upward of the slab near the joint or crack due to moisture and/or temperature gradient contributes to the pumping condition. Lack of load transfer contributes greatly to faulting.

Improper Cross Section — An unsurfaced road should have a crown with enough slope from the centerline to the shoulder to drain all water from the road's surface. No crown is used on curves, because they are usually banked. The cross section is improper when the road surface is not shaped or maintained to carry water to the ditches.

Inadequate Roadside Drainage — Poor drainage causes water to pond. Drainage becomes a problem when ditches and culverts are not in good enough condition to direct and carry runoff water because of improper shape or maintenance.

Joint Load Transfer System Associated Deterioration — Develops as a transverse crack a short distance (e.g., 9 inches) from a transverse joint at the end of joint dowels. This usually occurs when the dowel system fails to function properly due to extensive corrosion or misalignment. It may also be caused by a combination of small diameter dowels and heavy traffic loadings.

Joint Seal Damage of Transverse Joints — A damage occurs when incompressible materials and/or water can infiltrate into the joints. This infiltration can result in pumping, spalling and blow-ups. A joint sealant bonded to the edges of the slabs protects the joints from accumulation of incompressible materials and also reduces the amount of water seeping into the pavement structure. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint.

Lane/Shoulder Drop-off or Heave — Difference in elevation between the traffic lane and the shoulder. Typically, the outside shoulder settles due to consolidation or a settlement of the underlying granular or subgrade material or pumping of the underlying material. Heave of the shoulder may occur due to frost action or swelling soils. Drop-off of granular or soil shoulder is generally caused from blowing away of shoulder material from passing trucks.

Lane/Shoulder Joint Separation — Widening of the joint between the traffic lane and the shoulder, generally due to movement in the shoulder. If the joint is tightly closed or well sealed so water cannot enter (or if there is no joint due to full-width paving), then lane/shoulder joint separation is not

APPENDIX B

	considered a distress. If the shoulder is not paved (i.e., gravel or grass), then the severity should be rated as high. If a curbing exists, then it should be rated according to the width of the joint between the asphalt surface and curb.
Longitudinal and Transverse Cracking	Cracks parallel to the pavement's centerline or laydown direction. They may be caused by (1) a poorly constructed paving lane joint, (2) shrinkage of the AC surface due to low temperatures or hardening of the asphalt, or (3) a reflective crack caused by cracks beneath the surface course, including cracks in PCC slabs (but not at PCC slab joints). Transverse cracks extend across the pavement centerline or direction of laydown. These may be caused by items (2) or (3) above. These types of cracks are not usually load-associated.
Longitudinal Cracks (Concrete)	Cracks occur generally parallel to the centerline of the pavement. They are often caused by improper construction of longitudinal joints or by a combination of heavy load repetition, loss of foundation support, and thermal and moisture gradient stresses.
Longitudinal Joint Faulting	Difference in elevation of two traffic lanes measured at the longitudinal joint. It is caused primarily by heavy truck traffic and settlement of the foundation.
Loose Aggregate	The wear and tear of traffic on unsurfaced roads will eventually loosen the larger aggregate particles from the soil binder. This leads to loose aggregate particles on the road surface or shoulder. Traffic moves loose aggregate particles away from the normal road wheel path and forms berms in the center or along the shoulder (the less-traveled areas).
Map Cracking or Crazing	A series of fine cracks that extend only into the upper surface of the slab surface. Map cracking or crazing is usually caused by over-finishing of the slab and may lead to scaling of the surface. Scaling can also be caused by reinforcing steel being too close to the surface.
Patch Deterioration	Deterioration of an area where the original pavement has been removed and replaced with either similar or different material. A patch is an area where a portion or all of the original slab has been removed and replaced with a permanent type of material (e.g., concrete or hot-mixed asphalt). Only permanent patches are included.

APPENDIX B

Polished Aggregate

It is caused by repeated traffic applications. When the aggregate in the surface becomes smooth to the touch, adhesion with vehicle tires is considerably reduced. When the portion of aggregate extending above the surface is small, the pavement texture does not significantly contribute to reducing vehicle speed. Polished aggregate should be counted when close examination reveals that the aggregate extending above concrete is negligible, and the surface aggregate is smooth to the touch. This type of distress is indicated when the number on a skid resistance test is low or has dropped significantly from previous ratings.

Popouts

A small piece of concrete that breaks loose from the surface due to freeze-thaw action, expansive aggregates, and/or nondurable materials. Popouts may be indicative of unsound aggregates and "D" cracking. Popouts typically range from approximately 1 inch to 4 inches in diameter and from ½ inch to 2 inches deep.

Potholes

A bowl shaped hole of various sizes in the pavement surface. The surface has broken into small pieces by alligator cracking or by localized disintegration of the mixture and the material is removed by traffic. Traffic loads force the underlying materials out of the hole, increasing the depth.

On gravel surfaced roads, potholes are bowl-shaped depressions in the road surface. They are usually less than 3 feet in diameter. Potholes are produced when traffic wears away small pieces of the road surface. They grow faster when water collects inside the hole. The road then continues to disintegrate because of loosening surface material or weak spots in the underlying soils.

Pumping & Water Bleeding

Ejection of water and fine materials under pressure through cracks under moving loads. As the water is ejected, it carries fine material resulting in progressive material deterioration and loss of support. Surface staining or accumulation of material on the surface close to cracks is evidence of pumping. Water bleeding occurs where water seeps slowly out of cracks in the pavement surface.

Pumping in concrete pavement is movement of material by water pressure beneath the slab when it is deflected under a heavy moving wheel load. Sometimes the pumped material moves around beneath the slab, but often it is ejected through joints and/or cracks (particularly along the longitudinal lane/shoulder joint with an asphalt shoulder). Beneath the slab there is typically particle movement counter to the direction of traffic across a joint or crack that results in a buildup of loose materials under the approach slab near the joint or crack. Many times some fine materials (silt, clay, sand) are pumped out, leaving a thin layer of relatively loose clean sand and gravel beneath the slab, along with voids causing loss of support.

APPENDIX B

	Pumping occurs even in pavement sections containing stabilized subbases.
Punchout	A localized area of the slab that is broken into pieces. The punchout can take many different shapes and forms, but it is usually defined by a crack and a joint, or two closely spaced cracks (usually 5 feet wide). This distress is caused by heavy repeated loads, inadequate slab thickness, loss of foundation support, and/or a localized concrete construction deficiency (e.g., honey combing).
Ravelling and Weathering	Wearing away of the pavement surface caused by the dislodging of aggregate particles (raveling) and loss of asphalt binder (weathering). They generally indicate that the asphalt binder has hardened significantly.
Reflection Cracking	Joint reflection cracking is caused mainly by movement of the PCC slab beneath the asphalt concrete (AC) surface because of thermal and moisture changes; it is generally not load-initiated. However, traffic loading may cause a breakdown of the AC near the initial crack, resulting in spalling. A knowledge of slab dimensions beneath the AC surface will help to identify these cracks.
Rutting	A surface depression in the wheel paths. Pavement uplift may occur along the sides of the rut; however, in many instances, ruts are noticeable only after a rainfall, when the wheel paths are filled with water. Rutting stems from a permanent deformation in any of the pavement layers or subgrade, usually caused by consolidation or lateral movement of the materials due to traffic loads. Rutting may be caused by plastic movement in the mix in hot weather or inadequate compaction during construction. Significant rutting can lead to major structural failure of the pavement and hydroplaning potential. Wear of the surface in the wheel paths from studded tires can also cause a type of "rutting".
Scaling	Deterioration of the upper to ½ inch of the concrete slab surface.
Shoving	A permanent, longitudinal displacement of a localized area of the pavement surface caused by traffic loading. When traffic pushes against the pavement, it produces a short, abrupt wave in the pavement surface. This distress normally occurs only in unstable liquid asphalt mix (cutback or emulsion) pavements. Shoves also occur where asphalt pavements abut PCC pavements; the PCC pavements increase in length and push the asphalt pavement, causing the shoving.

APPENDIX B

Shrinkage Cracking	Hairline cracks that are usually only a few feet long and do not extend across the entire slab. They are formed during the setting and curing of the concrete and usually do not extend through the depth of the slab.
Slippage Cracking	Crescent or half-moon-shaped-cracks generally having two ends pointed into the direction of traffic. They are produced when braking or turning wheels cause the pavement surface to slide and deform. This usually occurs when there is a low-strength surface mix or poor bond between the surface and next layer of pavement structure.
Spalling (corner)	Raveling or breakdown of the slab within approximately 1 feet of the corner. However, corner spalls with both edges less than 3 inches long will not be recorded. A corner spall differs from a corner break in that the spall usually angles downward at about 45 degree to intersect the joint, while a break extends vertically through the slab. Corner spalling can be caused by freeze-thaw deterioration, "D" cracking, and other factors.
Spalling (Transverse and Longitudinal Joint Crack)	Spalling of cracks and joints is the cracking, breaking, or chipping (or fraying) of the slab edges within 2 feet of the joint/crack. A spall usually does not extend vertically through the whole slab thickness but extends to intersect the joint at an angle. Spalling usually results from (1) excessive stresses at the joint or crack caused by infiltration of incompressible materials and subsequent expansion, (2) disintegration of the concrete from freeze-thaw action of "D" cracking, (3) weak concrete at the joint (caused by honey-combing, (4) poorly designed or constructed load transfer device (misalignment, corrosion), and/or (5) heavy repeated traffic loads.
Swelling	An upward bulge of the asphalt pavement's surface, or movement or heave of the slab surface resulting in a sometimes sharp wave over a small area or a longer, gradual wave. The swell is usually accompanied by slab cracking. It is usually caused by frost heave in the subgrade or by an expansive soil. Swells can often be identified by oil droppings on the surface as well as riding over the pavement in a vehicle.
Transverse and Diagonal Cracks	Linear cracks are caused by one or a combination of the following: heavy load repetition, thermal and moisture gradient stresses, and drying shrinkage stresses. Medium- or high- severity cracks are working cracks and are considered major structural distresses. They may sometimes be due to deep-seated differential settlement problems.

APPENDIX C

LIFE CYCLE

19 PAVEMENT/IMPROVED SURFACES

19.01 ROADWAYS

Asphalt surfaced pavement	20 YRS
Gravel surfaced pavement	5 YRS
Concrete surfaced pavement	20 YRS

Source:
AASHTO Guide for Design of Pavement Structures, 1986

19.02 PARKING LOTS

Asphalt surfaced parking lots	20 YRS
Gravel surfaced parking lots	5 YRS
Concrete surfaced parking lots	20 YRS

Source:
AASHTO Guide for Design of Pavement Structures, 1986

19.03 SIDEWALKS/WALKWAYS

Asphalt surfaced sidewalks	20 YRS
Concrete surfaced sidewalks	20 YRS

Sources:
AASHTO Guide for Design of Pavement Structures, 1986

19.04 OPEN STORAGE AND HARDSTANDS

Asphalt surfaced pavement	20 YRS
Concrete surfaced pavement	20 YRS

Source:
AASHTO Guide for Design of Pavement Structures, 1986